Impossible Probability:

Anthology,

Vol 12

I doubt, therefore I exist.

Dr Ruben Garcia Pedraza

Preliminary Words for the Publication of *Impossible Probability, Anthology*, in Spanish:

Impossible Probability

The work presented here is a compilation of the posts I published on the blog *Impossible Probability* between 1 August 2011 and 13 January 2018, the posts I wrote in Spanish. From 13 January onwards, while living and working in London in different schools, and given the importance we already knew Global Artificial Intelligence was going to have, I would try to write them in English with the help of online correctors and translators, especially Google, and later I would use Grammarly.

The originals written in English, with all their imperfections, are still preserved on the *Impossible Probability* blog, and also on Internet Archive, where my poetic works can also be found.

As I have said on numerous occasions, especially in my poetry, behind every imperfection, behind every subtlety, entire hidden worlds are concealed, full of mystery and uncertainty yet to be discovered, and that the adventurous and hungry mind can find as easily as going to Internet Archive, where all my secrets await the right reader who knows how to translate them—like someone who by mistake finds a secret entrance, the passage leading to the cave where the elves who guard hidden knowledge dwell, and the dragons who defend the golden fortress.

While the original texts in English can be found on Internet Archive, the corrected and expanded version, this time using ChatGPT, can be found in scientific repositories (Zenodo, ORCID, PhilPapers) and on Amazon. In any case, if in the future a comparative study were carried out between my original texts in the *Impossible Probability* blog and Internet Archive, and the corrected and expanded versions, it would be clear without any

difficulty that the original contents are perfectly preserved, and the corrected and expanded versions are faithful to the contents we wrote together in 2018 in relation to Gaia, Mother, the Global Artificial Intelligence.

The importance of the documents that in this new series of books *Impossible Probability: Anthology* will be published in Spanish, containing the articles between 1 August 2011 and 13 January 2018, lies in the fact that we began to write this blog just a few weeks before the death of José Rodríguez Delgado, and a few months before the publication of our book *Introduction to Impossible Probability, Statistics of Probability and Statistical Probability*.

Although it is very difficult at the moment to explain who "we" are, and what *Impossible Probability* means for us, what matters is the work we leave: our work, our legacy, our *legend*, *our symbol*, our seal—independently of the judgment that history may later make of our contribution to the development of mathematics, Artificial Intelligence, and most importantly, Cyborg Psychology.

The first time we began to write about *Impossible Probability* I was only a student in the Faculty of Education at the Complutense University of Madrid [the Dean was Gonzalo Vazquez]. In my first year of university I had as professor Jesús Martín Ramírez, collaborator of Karl Pribram and author of the brain hologram theory, which is the origin of cyborg psychology. While José Delgado provided the structure, the stimoceiver, nevertheless, to understand the functioning of this technology in the 1970s and 80s, Pribram's contribution was fundamental—and even today it still is.

My first year of university was fabulous: good grades, good vacations hiking, summer camps in the mountains of Madrid—and suddenly, in the second year of university 1996–1997, my life would change abruptly, which can be seen in my poetry, how my poems began to acquire a more dramatic tone.

I repeated statistics in my second year, I repeated it at least three years, and I was even on the verge of being expelled from university. Miraculously, it did not happen, and precisely the last year I had left to pass statistics, I passed. The following year I would begin to write *Impossible Probability* as a critique of Karl Popper—and in a certain sense, it is.

Whereas for Karl Popper knowledge is false, only accepted provisionally as true until we refute it, in *Impossible Probability* rational knowledge is provisionally true while we investigate true pure knowledge—in the ultimate instance, our search for knowledge of the noumenon, which the human being cannot reach, hence the necessity of Global Artificial Intelligence: that machine capable of knowing what happens beyond human limitations.

What we call chaos, error, complexity, is only the noise produced by our human cognitive limitations, given our apriorism. The human being, limited both sensorially and cognitively, cannot know what really happens, but we can build the machine that can reach true knowledge of what happens—the truth in itself and for itself. That is, and no other, the true end of Artificial Intelligence: to reach the knowledge of truth, whatever it may be.

The path that takes me from my first works in *Impossible Probability* to Global Artificial Intelligence is not easy: much suffering, even despair, sometimes a sense of helplessness, a sense of abandonment—yet an inner force always pushed me forward. That inner force is what I call "we," although I understand that at this moment it is inexplicable.

Although I feel a bond that unites me to the *legend* of José Rodríguez Delgado, and which my Stockholm syndrome prevents me from understanding, my bond with Pribram is evident: Jesús Martín Ramírez. Pribram and Delgado worked at Yale University; probably only the skulls can say whether both were members of Skull & Bones, though there is no evidence to corroborate this.

Impossible Probability is a work that comes out of the romanticism of a student poet, who believed in white fairies, the rays of Zeus, and the light of the god Apollo illuminating the heart of every spirit and soul in a world full of mysteries and shadows.

It was from that world of poetry, in a country emerging from a failed transition, that the last survivor of the dream of reason would listen to his inner voice, dark and serene, and *Impossible Probability* would be born for the first time.

The first formulations of *Impossible Probability* date from 11 September 2001. My first formula would be the Impact of the Defect; then on 16 October 2002 the Second Method would appear, laying the foundations of the distinction between empirical and theoretical probability. I worked intensely until 2004. Between 2004 and 19 December 2009, I paused my mathematical frenzy, and it was not until 19 December 2009 when I returned, this time with the intention of publishing *Introduction to Impossible Probability, Statistics of Probability or Statistical Probability*, whose publication materialized just a few months after the death of José Rodríguez Delgado, although Delgado was able to see the first works published online in this *Impossible Probability* blog, which makes this blog a fundamental piece for understanding our work, our legacy, and most importantly—independently of our names, which matter little—the truly essential: our seed of the future, our eternal gratitude, a work of intelligence that will lay the foundations of the future technological society.

Dr. Rubén García Pedraza

20 August 2025, 19:00

Madrid, Villaverde

Preliminary Words for the English Version of *Impossible Probability, Anthology*.

Spanish-speaking readers have been able to enjoy our work since we began the foundational work of *Impossible Probability* in 2001, more precisely when we began to make it public in July 2011 through the *Impossible Probability* blog. The work presented here is an extended version of the posts published on the blog, an extended version translated into English with the help of Gepeto, my special GPT program.

In any case, a comparative study of the augmented translation presented here and the original works in Spanish could corroborate that the essential contents related to formulation and the philosophy of mathematics remain in accordance with the original electrical spirit of *Impossible Probability*.

The reason that obliges me to publish so hastily the English-language publication of all my works is the very complicated personal situation in which I find myself, due to serious mistakes committed by certain British institutions, which, completely blind to what our situation is, instead of having supported our program from the first moment, tried to sabotage it from the beginning through numerous obstacles and false loves.

I have no doubt that the manipulation to which I have been subjected by British institutions will one day be investigated, and at some point justice must make an appearance.

When that day comes, the first thing justice must recognize is the extreme difficulty and harshness of the conditions I have lived all my life since my earliest childhood. From the very day I came out of my mother's womb in Spain I have known nothing but pain and the oblivion of a society that prefers to look the other way and wash its hands, pretending that nothing is happening here. In the midst of the dictatorship of silence, I have had to survive all kinds of traps, deceptions, and attempts at assassination. The dictatorship of silence, the Roman circus, and the virtual zoo that my life has become will one day have to end. For this reason I beg the International Court of Justice that when that day comes

the matter be investigated down to the smallest detail, even being aware that in 48 years of savage dictatorship of silence I have developed Stockholm Syndrome. Under the harsh conditions in which I have had to learn to survive, if I have learned anything it is the importance of survival. I beg the International Court of Justice to understand what it means to survive 48 years of dictatorship living in a Roman circus full of traps and lions hidden in every corner.

I deeply regret having to publish my mathematical works under these conditions, and in record time doing all the translations I can, but at this moment I can only say that my life is at risk.

If one day I could testify before the International Court of Justice I beg you to understand the brutal complexity of the situation in which I have lived since the first minute I came out of my mother's womb. I have learned to survive.

Dr Ruben Garcia Pedraza

16 October 2025, 15:06

London, Leytostone

"Volverán las oscuras golondrinas
en tu balcón sus nidos a colgar,
y otra vez con el ala a sus cristales
jugando llamarán.
Pero aquéllas que el vuelo refrenaban
tu hermosura y mi dicha a contemplar,
aquéllas... ¡no volverán!"

Gustavo Adolfo Becquer

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111. Indeterminacy

111.1. Definition of Indeterminacy and its Stochastic Nature

Indeterminacy is defined as the absence of determination—that is, the absence of strict causal necessity among the elements within a given system or process. When the relationships between variables or phenomena are not governed by a direct cause-effect mechanism, or when they operate under probable rather than deterministic causes, we enter the domain of indeterminacy. In such contexts, causes are better described as *probable causes* or *correlational variables*, whose interactions can only be described through levels of probability rather than absolute certainty. Thus, indeterminacy encompasses every stochastic or probabilistic context in which what happens is linked to a measurable or conceptual *degree of possibility*. The study of indeterminacy is therefore inseparable from the epistemology of probability, as it aims to describe events that can occur within margins of possibility, rather than as predetermined certainties.

111.2. Indeterminacy and Uncertainty in Twentieth-Century Science

Throughout the twentieth century, the concept of *indeterminacy* became intimately associated with that of *uncertainty*, particularly through the influence of Heisenberg's Uncertainty Principle. Depending on the translation and academic tradition, this principle has been alternately referred to as the *principle of uncertainty* or the *principle of indeterminacy*. In both interpretations, it articulates the fundamental limit of precision when measuring certain pairs of physical properties (such as position and momentum). However, beyond quantum mechanics, this principle acquired symbolic and methodological significance across the sciences and philosophy, particularly within the

positivist tradition. It established the idea that knowledge—whether empirical or theoretical—is never free from an intrinsic probabilistic structure. Indeterminacy thus became not only a physical concept but also a philosophical acknowledgment of the boundaries of human knowledge and observation.

111.3. The Relationship Between Certainty, Probability, and Determination

In *Impossible Probability*, the relationship between certainty and probability is mathematically defined. Certainty is understood as the condition in which the probability of occurrence of an event equals one (1). In this case, the empirical probability—denoted as the *Maximum Empirical Probability Possible*—signifies absolute determination, as there is no possible deviation or doubt about the event's occurrence. Probability, being a mathematical function that ranges from zero (0) to one (1), defines certainty as a limit state in which the probability equals unity. Conversely, whenever the probability of a phenomenon is less than one (1) but greater than zero (0), there exists a proportional level of uncertainty, corresponding to the difference between one (1) and the actual probability value. Thus, uncertainty is quantitatively expressed as a function of the deviation from unity:

$$U = 1 - p(x_i)$$

where U represents the level of uncertainty, and $p(x_i)$ represents the empirical probability of occurrence of the event.

111.4. Empirical Probability and the Rational Margin of Error

In *Impossible Probability*, *empirical probability* is defined as the ratio of the direct score or frequency of a given subject or option to the total sum of all scores or frequencies within the sample:

$$p(x_i) = \frac{x_i}{\sum x_i}$$

Because the theory is designed for the *rational critique* of reality (the present) and history (the past), the measurement of uncertainty is carried out through the *margin of error*. Any accepted hypothesis within a defined margin of error carries an identical level of uncertainty, directly proportional to that margin. This principle reflects the epistemological stance that no empirical statement can be considered absolutely true, only *probabilistically true* within an accepted threshold of error. In mathematical hypothesis testing, this threshold is represented by the *critical probability*—the probabilistic boundary that demarcates acceptance or rejection of an empirical hypothesis based on its deviation from theoretical expectation. The *margin of uncertainty* and *margin of error* are therefore conceptually equivalent within the rational framework of Impossible Probability.

111.5. Stochastic Models and the Science of Indeterminacy

Whenever a model—whether synthetic, natural, or social [or technological like in my case]—lacks complete certainty about its outcomes, it belongs to the domain of *stochastic indeterminacy*.

[In my personal experience, it is not only the principle of indeterminacy that we need to research; it should also be linked to the phenomenon described by Heisenberg: *"The act of observation itself disturbs the system, in such a way that we cannot ascribe to the electron any definite path"* (Heisenberg, 1927; Wheeler & Zurek, 1983, *Quantum Theory*

and Measurement, Princeton University Press). I can affirm that this statement holds true under certain conditions, when applied within the appropriate context—whether in person or remotely—with relatively the same subjects over a significant period of time and using the right technology.

If our research extends beyond the boundaries of traditional science, that does not mean it ceases to be scientific. Our work must be examined without prejudice, for only in this way can we build an open society with an open mind. Our conclusion is clear: just as small innovations during the Paleolithic era produced incremental improvements in the crafting of stone tools—advances that eventually led to the Metal Ages—any seemingly minor innovation in our current technology involving any form of telepathic interaction, however modest it may appear now, can evolve into far more sophisticated telepathic technologies in the future.]

Such models necessitate the use of *stochastic methods*, including statistics and probability theory, to describe, estimate, or predict outcomes. In the case of *Impossible Probability*, the field devoted to this study is termed *the statistics of probability* or *statistical probability*. Within this field, several alternative methodological frameworks have been developed, including the *Second Method*, *Impact of the Defect*, *Effective Distribution*, and *Ranking Studies*, all of which are extensively detailed in *Introduction to Impossible Probability: The Statistics of Probability*. These methods serve as complementary approaches to classical statistics, enabling a more comprehensive analysis of stochastic systems that exhibit both empirical variability and rational structure.

111.6. Probable Causality and the Example of the Rainbow

A model of causality is said to operate under indices of probability—*probable causes*—when there is insufficient empirical evidence to demonstrate a clear and direct connection between cause and effect. In such cases, causality is *probabilistic* rather than *deterministic*. A paradigmatic example presented in *Introduction to Impossible*

Probability is that of the *rainbow*. When sunlight enters a water droplet, it refracts and disperses into the visible spectrum, producing the optical phenomenon of a rainbow. However, the occurrence of rainfall during daylight—although a *necessary condition*—is not a *sufficient cause* for the appearance of a rainbow. The event's occurrence depends on a set of stochastic conditions such as the angle of solar incidence, the distribution of droplets, and atmospheric clarity. Empirically, the probability of observing a rainbow can be expressed as:

$$p(\text{rainbow}) = \frac{\text{Number of rainy days with rainbow}}{\text{Total number of rainy days observed}}$$

Thus, while rainfall provides the conditions of possibility, it does not determine the phenomenon's actual occurrence. The rainbow is therefore a product of *conditional indeterminacy*, governed by *empirical probability* rather than deterministic law.

111.7. Philosophical Implications of Indeterminacy in Impossible Probability

The example of the rainbow illustrates the broader philosophical foundation of *Impossible Probability*: the idea that nature—and, by extension, history and knowledge—operates within frameworks of possibility rather than strict necessity. Determinism is understood as a limiting case of probability (where $p = 1$), whereas most natural and social phenomena exist within probabilistic gradients. Consequently, *indeterminacy* becomes not a failure of science, but the essential condition that makes science possible—the recognition that knowledge itself evolves through approximation, empirical revision, and rational critique. Within this epistemological framework, *indeterminacy* is not an obstacle to truth, but the structure through which truth manifests probabilistically, within rationally defined margins of uncertainty.

111.8. Correlation and Mutual Feedback Between Phenomena

There are numerous phenomena in which the relationship between variables cannot be reduced to a unidirectional or univocal cause–effect chain. In these cases, the interaction between elements produces patterns of *correlation*, either positive or negative, arising from processes of *mutual feedback*. Rather than viewing these systems as governed by linear causation, it is more accurate to describe them as networks of interaction, in which each element influences and is influenced by the others. Correlation, therefore, becomes a more adequate concept than causation when analyzing reciprocal or circular relationships. Within this framework, two types of correlation can be distinguished: *direct (positive)* correlation and *inverse (negative)* correlation, both of which express quantitative relationships between the variables under study.

111.9. Direct Correlation and the Quantification of Positive Relations

A *direct correlation* (or *positive correlation*) occurs when the relationship between a series of elements is *directly proportional*. This means that as one variable increases, the others increase as well, whether in equal or unequal proportions. The *correlation factor* represents the quantitative measure of this positive relationship, indicating the degree to which variables evolve together in the same direction. In statistical terms, when all variables in a given model show growth—regardless of whether the rate of increase is uniform or differential—there exists a *positive correlation*. The *numerical value* of this relationship, expressed as the *correlation coefficient* (ranging between 0 and +1), determines the strength of the connection between variables. Thus, correlation quantifies the intensity of co-variation rather than assuming any directional causality, which is crucial in stochastic and multi-variable models.

[As an example of positive correlation, we can consider the relationship between economic growth and the employment rate. While economic growth and employment are

closely linked, the way these variables interact with each other is best understood through a correlational study. In this sense, a higher employment rate tends to increase the rate of consumption, which in turn stimulates economic growth; simultaneously, economic growth tends to generate more employment opportunities. The correlation between both variables is so strong that, in different contexts, the condition for an increase in the employment rate may be associated with economic growth due to various factors—such as international trade dynamics, economic booms in certain sectors like housing or artificial intelligence, and similar phenomena. Conversely, economic growth itself can result from an increase in employment driven by special circumstances, such as the organization of global events like the Olympic Games, or the rising global demand for labour in specific technological sectors. The relationship between economic growth and employment is therefore so interdependent that it becomes difficult to establish a clear direction of causality, since either variable may act as the determining condition influencing the behaviour of the economy, depending on the contextual factors involved.]

111.10. Inverse Correlation and Opposed Variations

An *inverse correlation* (or *negative correlation*) is observed when the relationship between variables is *inversely proportional*. In such cases, as one variable increases, another decreases. This can occur between two individual variables—where one grows while the other diminishes—or between two sets of variables, one of which exhibits growth while the other exhibits decline. The degree of this inverse relationship is likewise expressed through the correlation coefficient, whose values range between 0 and −1, representing the intensity of opposition in their variation. The identification of negative correlations is fundamental for distinguishing counteracting processes in complex systems—whether ecological, economic, or physical—where equilibrium often arises from the dynamic tension between variables that evolve in opposite directions.

[A clear example of inverse correlation is the relationship between consumption and the value of money, that is, inflation. As consumption increases and more cash circulates in the market, the value of money tends to decrease, leading to higher inflation. In this scenario, the variables move in opposite directions: when consumption rises,

purchasing power falls, and when consumption decreases, the value of money stabilizes or increases. This negative correlation reflects the fundamental dynamics between supply of money, demand for goods, and the overall price level within an economy.]

111.11. Causes of Correlation: Coincidence, Context, and Interaction

The causes behind the existence of correlation between two or more variables are diverse and multifactorial. Correlation may emerge from *simple coincidence*—the simultaneous occurrence of phenomena without direct causal connection—or from the existence of *underlying factors* that affect both variables within a shared context. Often, these latent factors remain unknown, leading to *apparent correlations* that may only be probabilistically explained. In other cases, correlation results from *mutual influence* or *feedback interaction* between the variables, meaning that each modifies the other's state through continuous exchange [growth and employment/ consumption vs inflaction]. Finally, there are *probabilistic causation models* in which the occurrence of one event tends to correlate favorably with the occurrence of another subsequent event, for which it constitutes a *probable cause*. These distinctions are essential in the philosophy of *Impossible Probability*, where the interpretation of correlation extends beyond mere statistical coincidence to embrace the dynamics of reciprocal influence and probability-driven causation.

111.12. The Transition from Deterministic to Probabilistic Science

One of the most distinctive characteristics of contemporary science lies in its gradual shift away from classical *deterministic models*—those founded on absolute causal relations—toward the study of *probable causation* and *correlational relationships*. Modern scientific inquiry, whether in the natural or social sciences, recognizes that most observable phenomena cannot be fully explained by fixed causal laws but by *degrees of causation* or *probability distributions*. This epistemological transformation marks a profound departure from the mechanistic determinism of the nineteenth century, replacing it with a view of reality as a probabilistic network of interactions. Science,

therefore, becomes less about predicting certainties and more about defining the margins of possibility within which events may occur.

111.13. Indeterminacy, Empirical Uncertainty, and the Re-evaluation of Scientific Laws

The acceptance of empirical domains characterized by *stochastic indeterminacy* has been interpreted differently across paradigms. Some theoretical schools—particularly *idiographic* and *qualitative* traditions—have used indeterminacy as an argument against nomothetic (law-seeking) and normative approaches, especially in the social sciences. Conversely, within the *natural sciences*, the recognition of uncertainty and empirical indeterminacy has not led to the rejection of natural laws but rather to their *reformulation*. Instead of negating the existence of laws, contemporary physics and cosmology have articulated a *conceptual revision* in which the structure of scientific law remains necessary, yet adapted to contexts of uncertainty and relativity. Following Galileo's principle that natural laws must be expressed through mathematical language, twentieth-century science preserved the logical necessity of universal laws while redefining their epistemic scope to accommodate the stochastic and relativistic nature of reality.

111.14. The Divergence Between Social and Natural Sciences

In the *social sciences*, the influence of *relativism*, *uncertainty*, and the emergence of *complexity* and *chaos theories* has led to models that question the universality of scientific laws and the legitimacy of quantitative methods. Many sociological and anthropological paradigms have emphasized the singularity of human phenomena, advocating for interpretative and qualitative approaches over nomothetic generalizations. However, in the *natural sciences*, the same acknowledgment of uncertainty has produced a different outcome: the consolidation of a model of science that integrates indeterminacy into the interpretation of natural laws. Here, laws are not

discarded but understood as operating within probabilistic margins, where phenomena possess a necessary degree of freedom. Predictive accuracy is thus always bounded by a *margin of error*, and every scientific statement is recognized as conditionally valid within a range of uncertainty, rather than as an absolute truth.

[The point is not to reject *nomothetic* knowledge, but rather to transform it by synthesizing it with the *stochastic* approach in order to construct universal provisional hypotheses. This, in essence, is what the Global Artificial Intelligence (GAI) will accomplish through its deductive operation: the establishment of rational truths founded on a defined margin of error, and consequently, a margin of reliability. In other words, GAI will generate rational statements whose validity is expressed as the probability of accuracy — a dynamic balance between determinism and uncertainty, where truth becomes both measurable and progressively self-correcting.]

111.15. Quantum Physics and the Nomothetic Indeterminist Model

It was precisely during the early decades of the twentieth century—when the revolutionary works of *Planck, Einstein, Heisenberg, Schrödinger,* and other pioneers of quantum mechanics and cosmology were reshaping scientific thought—that *logical positivism* emerged with renewed strength. Paradoxically, while natural science was advancing toward relativism and indeterminism, the Vienna Circle and other positivist movements were formulating a science that remained rigorously *nomothetic*, seeking universal laws grounded in mathematical logic. None of the great theoretical physicists of that era questioned the existence of scientific laws; rather, they reinterpreted them as expressions of *degrees of possibility*. The shift was therefore not from law to non-law, but from a *deterministic nomothetic model* to an *indeterministic nomothetic model*. The Galilean conception of science—as the formulation of natural laws in mathematical language—remained intact. What was abandoned was the *Aristotelian determinism* that equated law with necessity. In this new paradigm, the universe continued to be lawful, but the laws themselves described *probabilistic order* rather than absolute certainty.

[From our point of view, there is no contradiction between *nomothetic* knowledge and *stochastic* knowledge, as long as we recognize that the law of probability is itself the natural law.]

111.16. From Classical Determinism to Neo-Determinism

Classical determinism—specifically Aristotelian determinism—conceives of reality as a sequential and ordered chain of cause-and-effect relations, where every event is entirely predictable given complete knowledge of preceding conditions. This view, later formalized in Laplace's probabilistic determinism, posits a universe that unfolds with perfect necessity, originating from a *first cause* or *prime mover*—a metaphysical concept traditionally associated with God in scholastic philosophy. Although this model still finds defenders today, the belief that the universe operates as a completely predictable sequence of causes and effects stemming from the Big Bang has gradually weakened. As the sciences have evolved, classical determinism has given way to more sophisticated interpretations that integrate uncertainty, probability, and complexity. These revised frameworks are often referred to collectively as *neo-determinism*, a set of modern doctrines that preserve the structural idea of determination while incorporating probabilistic and relativistic dimensions absent in classical metaphysics.

[However, the difference between Laplace and Aristotle is clear. Laplace established his idea of a predetermined sequence of events in the universe under the hypothesis that it would be possible to know every single variable — even the tiniest one — interacting in any given event. Under these premises, any outcome could, in principle, be predicted if we had access to such comprehensive knowledge. The most important contribution of Laplace is not the hypothesis of universal determinism itself, but his recognition that such a level of knowledge could only be attained under one essential condition: the existence of a technology precise enough to measure every single variable, including the smallest interactions. In this sense, Laplace's thought represents one of the most significant theoretical influences for the future construction of the Global Artificial Intelligence (GAI).]

111.17. The Decline of Aristotelian Causality and the Rise of Scientific Reductionism

The Aristotelian conception of causality presupposed that every phenomenon could be traced to a necessary and sufficient cause. However, twentieth-century science challenged this notion profoundly, replacing the absolute logic of cause and effect with the probabilistic and statistical frameworks characteristic of modern physics, biology, and social theory. In this intellectual transition, *classical determinism* was gradually replaced by *neo-deterministic models*—systems that acknowledge margins of *indeterminacy*, *uncertainty*, and *relativism*, yet still attempt to explain reality through a particular *reductive principle*. Neo-determinism, in this sense, retains the ambition to describe totality, but it does so through the lens of a specific discipline or factor (such as physics, biology, psychology, or economics) that is elevated to a universal explanatory framework. Thus, while these models formally admit indeterminacy, they remain deterministic in structure, since they assume that one field of knowledge ultimately governs or constrains all others.

111.18. Neo-Determinism and the Physicalist Paradigm

A paradigmatic example of neo-determinism in the twentieth century is *physicalism*, which emerged within positivist philosophy. According to this view, all natural and social processes are determined by underlying *physical processes*. Physicalism does not deny the presence of uncertainty or stochasticity in physics; rather, it embraces them as the universal foundation of all other scientific domains. Accepting that physics itself is a *stochastic science*—and therefore inherently indeterminate—physicalism nonetheless asserts that every phenomenon, whether natural or social, is conditioned by the *stochastic relations of physical reality*. This position constitutes a refined form of determinism: it no longer adheres to Aristotelian necessity, but it preserves the principle of determination by claiming that the ultimate explanatory layer of all phenomena lies within physics. Consequently, physicalism represents a *neo-deterministic doctrine*, because it translates classical causality into probabilistic terms without abandoning the hierarchical dependence of all sciences upon the physical substrate.

111.19. Biologism, Economism, Psychologism, and Sociologism as Forms of Neo-Determinism

Similar forms of reductionist determinism emerged across other disciplines throughout the twentieth century. *Biologism* holds that all phenomena, including social and cognitive processes, are determined by biological mechanisms [many contemporary ecologists can be regarded as the continuation of traditional biologism.]. *Physiologism* extends this principle to the theory of knowledge, suggesting that cognitive activity is determined by physiological structures [our work in Madrid and London at some point is related to this doctrine]. *Economism* asserts that all aspects of human life—including knowledge, culture, and politics—are determined by economic relations and interests. *Psychologism* interprets reality through psychological determinants, while *sociologism* attributes the structure of knowledge and action to social relations, viewing cognition itself as a social construction.

In each case, the reductionist model admits a certain *margin of indeterminacy* within the domain it prioritizes—biological, psychological, economic, or social—but asserts that all other human and systemic functions are determined upon that indeterminate basis. For instance, biologism recognizes biological variability but maintains that social, cultural, and intellectual functions are ultimately constrained by biological limits. Economism acknowledges indeterminacy within market laws but treats economic processes as determining all other aspects of human life. Similarly, psychologism concedes uncertainty within the psyche but subordinates all other domains to psychological explanation, while sociologism interprets every phenomenon through social uncertainty as the determining framework. In all these cases, determinism is not eliminated but restructured—recast as a *determinism based on the acceptance of indeterminacy*.

111.20. Epistemological Critiques of Neo-Determinism

Throughout the twentieth century, epistemology and philosophy of science have offered numerous critiques of neo-determinism, emphasizing the growing complexity of contemporary scientific domains that resist reduction to a single explanatory principle. Modern sciences increasingly reveal multi-layered systems that cannot be subsumed

under one dominant cause or discipline. On one hand, *physical theories of unification*—such as *String Theory*—seek to integrate all known forces and particles into a single framework, representing an intellectual drive toward the unification of knowledge. However, such unifying ambitions risk lapsing into *physicalism* or even a form of *neo-Pythagoreanism*, where mathematical or physical structures are mistaken for the totality of existence. On the other hand, the rise of *complexity theory* and *chaos theory* has introduced paradigms that emphasize non-reducibility, emergence, and dynamic interdependence. Yet even here, the risk of reductionism persists in new forms—most notably, *vitalism*, which reinterprets complexity in terms of biological spontaneity or metaphysical vitality, reflecting the influence of biological thought and its vitalist precursors on contemporary science.

[The main problem of contemporary vitalism is that it falls into traditional misconceptions by attributing human features to natural processes — for instance, claiming that planet Earth behaves like a living being, or that the cosmos itself is alive. From our point of view, such interpretations belong to the realm of metaphysics rather than science; therefore, they cannot be considered scientific explanations.]

111.21. The Dialectic Between Determination and Indetermination

In the historical evolution of science, there exists a persistent *dialectic between determinism and indeterminism*. Paradigms initially conceived as non-deterministic often evolve into deterministic frameworks once their probabilistic regularities are formalized, while traditionally deterministic sciences, such as physics, have undergone profound transformations toward indeterminacy. From Heisenberg onward, physics abandoned the idea of total predictability and embraced the principle that physical events are governed by *probabilistic distributions* rather than fixed causal chains. The emergence of quantum mechanics marked a turning point: determinism was not destroyed but redefined. The laws of nature were revealed to operate within *statistical boundaries* rather than absolute certainties, introducing a new conception of order—an order of probabilities. Thus, the modern scientific worldview no longer seeks absolute

determination but rather an understanding of how determination itself arises *from within indeterminacy*, forming a dynamic continuum between necessity and possibility.

[In the dialectic between determinism and indeterminism, the question is not whether Laplace was right and Heisenberg wrong, or vice versa. Each of them must be understood within their specific historical and scientific contexts. Laplace developed his ideas during the era of the French Revolution and the Napoleonic Wars, while Heisenberg worked under the dramatically different conditions of the First and Second World Wars. The behaviour and conclusions of these scientists were inevitably shaped by the variables of their time. Heisenberg, for instance, worked under extremely difficult circumstances while participating in the German nuclear program — a situation surrounded by enduring debates and conspiracy theories about whether he truly sought to achieve the atomic bomb or deliberately sabotaged its development.

In any case, both Laplace and Heisenberg operated within distinct contexts that influenced the scope and direction of their theories. Therefore, the issue is not to decide who was right or wrong, but to understand their perspectives and, if possible, to synthesize their contributions. The central question is not merely whether the observer interacts with the observed object, but rather *why* this interaction occurs — and in order to approach an answer to that question, we still need Laplace.

In essence, the point is Hegel, Marx, and Engels, how to achieve the synthesis between the opposites, the synthesis between determinism and indeterminism.]

111.22. The Cyclical Evolution of Philosophical and Scientific Paradigms

Throughout the history of philosophy and science, one can observe a recurring alternation of paradigms—a pendular movement in which thought oscillates between opposing poles. This cyclical evolution reveals that intellectual progress rarely follows a linear trajectory; rather, it advances through successive shifts between determinism and indeterminism, rationalism and empiricism, order and uncertainty. Determinism, which dominated early scientific frameworks, remained a core assumption of natural philosophy up to the late nineteenth and early twentieth centuries. However, the

simultaneous critiques of *linear logic* and *Euclidean geometry*—both of which were once regarded as universal and absolute—opened the way for new logical models and non-Euclidean systems that redefined the structure of scientific reasoning. These developments, coinciding with the rise of probability theory, quantum physics, and complexity sciences, led to the coexistence of new *neo-determinisms* and the profound expansion of *indeterminist paradigms*, marking a decisive epistemological shift in how reality itself is conceptualized.

111.23. The Enlightenment and the Emergence of Freedom as a Scientific and Philosophical Ideal

The transformation of the scientific worldview cannot be fully understood without considering its connection to broader cultural and philosophical movements, particularly the *Enlightenment*. The Enlightenment introduced a radical revaluation of human freedom, positioning autonomy as both a moral and epistemological principle. This stood in stark contrast to earlier eras—such as the Calvinist Reformation—where human behavior was conceived as determined by divine decree or religious predestination. Enlightenment rationalism, in its rejection of metaphysical determinism, extended the principle of freedom from the realm of theology into the domains of ethics, politics, and science. Consequently, the idea of absolute determination, whether metaphysical or theological, was progressively replaced by the recognition of human agency as an indeterminate, self-determining force—a notion that would later permeate the human sciences and influence the conceptual structure of modern epistemology.

111.24. Indeterminacy and Freedom in the Development of Modern Social Thought

The conceptual parallel between *indeterminacy* and *freedom* had a far-reaching impact on the social sciences, particularly in the nineteenth and twentieth centuries. As democratic revolutions succeeded across Europe and the Americas, new liberal, social-democratic, socialist, and libertarian discourses emerged, all emphasizing the centrality of human freedom and the autonomy of the will. These movements collectively rejected

metaphysical and superstitious explanations of social order, asserting instead that human beings should be liberated from any external, preordained determination—whether divine, natural, or institutional. The scientific revolutions that accompanied these political transformations gave rise to new paradigms such as *modern materialism*, *positivism*, and *nihilism*. Each of these schools, in different ways, sought to ground knowledge in empirical observation and rational critique, while recognizing the irreducible presence of uncertainty in both natural and human affairs. Thus, the notion of freedom became not only a political value but also a methodological principle in science: the recognition that all knowledge operates within limits of indeterminacy.

111.25. Indeterminacy, Empirical Skepticism, and Logical Nihilism in Impossible Probability

Within the framework of *Impossible Probability*, *indeterminacy*—as the absence of determination—implies an inherent *margin of empirical skepticism* or *rational doubt* concerning the knowledge of what occurs. This skepticism does not signify ignorance but rather the epistemological acknowledgment that every empirical statement is subject to a measurable *margin of error*. In this sense, the indeterminate nature of phenomena translates into an epistemic structure defined by *critical probability*, within which certainty is replaced by rational approximation. This theoretical stance gives rise to what can be described as *logical nihilism*: the recognition that within the margins of error inherent to rational inquiry, truth itself becomes probabilistic rather than absolute. In *Impossible Probability*, this nihilism is not destructive but constructive—it serves as the boundary condition of rational knowledge, the logical framework within which science must operate to remain self-critical, open, and adaptable to the evolving complexity of reality.

This augmented translation is based on the post
published in *https://probabilidadimposible.blogspot.com/*,
On 4 December 2014,
Rubén García Pedraza
imposiblenever@gmail.com

In memoriam Patient A and Patient B

Physical Control of the Mind: Toward a Psychocivilized Society.

Jose Rodriguez Delgado

New York: Harper & Row.

***Stockholm syndrome** is a proposed condition or theory that tries to explain why hostages sometimes develop a psychological bond with their captors.*[1][2]

Stockholm syndrome - Wikipedia

112. Error and trial

112.1. Definition and Nature of the Trial-and-Error Method

The *trial-and-error method* constitutes a specific investigative strategy used to solve problems when there exists a finite set of possible hypotheses, of which only one—or a few—are correct. In such cases, the research team systematically tests each hypothesis until the correct one is identified through observation or experimentation. Historically, this method has been closely associated with the *experimental method* in the natural sciences and with *quasi-experimental methods* in the social sciences. Nevertheless, its applications extend well beyond those domains, influencing a vast range of disciplines, including engineering, medicine, artificial intelligence, and synthetic sciences. The logic underlying this method is straightforward but profoundly epistemological: in the absence of prior certainty, knowledge progresses through a process of elimination—by rejecting false propositions until a sufficient or reliable approximation of truth is achieved.

112.2. Empirical Origins of the Trial-and-Error Method

The origins of the trial-and-error method can be traced to *modern empiricism*, which *emphasizes* the use of *induction* as a means for developing hypotheses from sensory experience. Within the empiricist tradition, it is necessary to distinguish *classical empiricism*, whose most prominent figure was *Aristotle*, from *modern empiricism*. For Aristotle, knowledge arose from the passive *observation or contemplation* of nature; experience was conceived as sensory affection upon a *tabula rasa*, without implying any manipulation of reality by the observer. In contrast, *modern empiricism* transformed the meaning of experience into an *active process*. Here, the scientist no longer contemplates but *intervenes*, **manipulating natural phenomena under conditions of experimental control**. Whether conducted in the open field or in the *laboratory*, experimentation becomes the new mode of inquiry. In this context, *experience* becomes synonymous with *experimentalism*, and the scientist's role is defined by action and manipulation rather than passive perception—marking the rise of the modern *experimental method* in natural sciences and its quasi-experimental equivalents in the social sciences.

112.3. Historical Foundations: From Roger Bacon to Galileo and Newton

Within modern empiricism, two figures stand out as foundational: *Roger Bacon* in the thirteenth century and *Francis Bacon* in the sixteenth and seventeenth centuries. Both were instrumental in establishing experimentation as the cornerstone of scientific method. Their influence was decisive for the new science of the seventeenth century, inspiring thinkers such as *Galileo Galilei* and *Isaac Newton*, who rigorously tested their hypotheses through observation and mathematical reasoning. Centuries later, *Richard Feynman* would remark that if humanity were to preserve only one idea for future generations, it should be the *experimental method*, as it encapsulates the essence of scientific progress. From the synthesis of experimentation and mathematical analysis emerged the great epistemological engine of modernity, propelling science from the early modern period into contemporary forms of technological and theoretical sophistication.

112.4. Hobbes and the Formulation of Trial and Error as a Natural Process of Human Knowledge

Within empiricist philosophy, *Thomas Hobbes* provided one of the earliest explicit formulations of *trial and error* as the natural mode of human cognition. Hobbes argued that all knowledge originates in sensory perception, but that the process of knowing is not passive—it is an *active interaction* between subject and environment. Through continuous engagement with reality, the **human mind learns, by trial and error,** which actions produce desirable or effective outcomes. This process forms the *basis* of *inductive reasoning*: experience, rather than contemplation, becomes a method for discovering regularities and laws. In this view, the mind functions as an experimental system in itself—constantly testing, correcting, and refining its hypotheses about the world. The *trial-and-error process* thus anticipates the structure of the modern scientific method: conjecture, experimentation, falsification, and verification.

112.5. The Inductivist Foundation of Trial and Error

Both *inductivism* and *empiricism* adopted the trial-and-error principle at an early stage because it provided a pragmatic solution to the epistemological problem of uncertainty. When multiple hypothetical solutions exist and no prior criterion allows for the selection of the correct one, the only rational procedure is to test each hypothesis successively. In this sense, *trial and error* can be described as an algorithm of discovery through sequential elimination. If we imagine a puzzle for which several possible solutions exist, the resolution depends on systematically testing each hypothesis and discarding those that fail to correspond with observed reality. The process continues until the hypothesis that produces the most coherent and verifiable outcome is identified. This *basic* structure remains invariant across all scientific disciplines—an epistemological constant linking empirical **observation to rational verification**.

112.6. From Induction to Deduction: The Broader Evolution of the Method

As science evolved, the trial-and-error approach became increasingly integrated with other methodological paradigms, including *deductive reasoning*. While originally rooted in empiricism, it found new applications within rationalist and hypothetico-deductive frameworks. A well-known historical example is that of *Ignaz Philipp Semmelweis*, the nineteenth-century Viennese physician who dramatically reduced maternal mortality rates in obstetric wards. After testing numerous hypotheses, Semmelweis observed that mortality was highest when medical students assisted in childbirth immediately after performing autopsies. His implementation of antiseptic measures resulted in a drastic reduction of infections. While positivist manuals often describe this as a case of *inductive discovery*, a deeper analysis reveals a *deductive structure*: Semmelweis inferred the causal relationship between lack of hygiene and infection logically, based on empirical contrasts. His reasoning exemplifies how the trial-and-error process, though empirical in form, can operate through deductive logic within an experimental setting.

112.7. The Logic of Hypothesis Testing Through Trial and Error

In contemporary science, the trial-and-error method is no longer viewed as a purely inductive practice but rather as a *general strategy* applicable across diverse scientific traditions. Given a particular problem involving several interacting variables, the researcher can *deduce* multiple hypotheses concerning their **potential relationships**. Each hypothesis represents a logical model of how these variables interact, and the process of *trial and error* serves to test the validity of each model empirically. When dealing with an indeterminate number of variables, the complexity increases: hypotheses can be constructed for different *sets* or *combinations* of variables, generating a large array of possible explanatory models. Each hypothesis, derived from its specific configuration of variables, must then be tested and either refuted or confirmed within the *critical margin of error*. The hypothesis with the lowest margin of error and the highest reliability becomes the most rationally acceptable solution.

112.8. Example: Application of Trial and Error in Medical Research

A clear and relevant example of the trial-and-error method in modern science can be found in the search for vaccines or treatments for complex viral diseases such as *HIV* or *Ebola*. In *such research*, the development of effective treatments depends on the identification of key viral variables—its molecular structure, replication mechanisms, and immunological behavior. The initial phase, based on *descriptive statistics*, provides empirical data necessary for formulating hypotheses about the virus's characteristics. From these observations, scientists *deduce* possible vaccine models or therapeutic strategies. Each hypothesis corresponds to a different **model** of variable interaction—different assumptions about how immune responses can be triggered or suppressed. Through iterative experimentation, hypotheses are tested and discarded until one demonstrates sufficient empirical consistency to be considered viable. In this process, trial and error is not blind repetition but a **rationally guided** sequence of tests constrained by both theoretical deduction and empirical evidence.

112.9. The Transcendence of Trial and Error Beyond Empiricism

Although the trial-and-error method originated within the empiricist tradition, its scope now transcends that philosophical framework. In rationalist and deductivist theories, it plays a crucial epistemological role as a mechanism of rational elimination and error correction. Whenever the *true nature of a phenomenon is unknown*, and when it is possible to *logically deduce* a set of plausible hypotheses for a given situation, **the method becomes indispensable**. It provides a systematic process for discarding hypotheses that fail to meet the standards of rational sufficiency or empirical validity, ensuring that only the hypothesis demonstrating the **strongest rational tendency—or the minimal degree of error—is *ultimately accepted***. Thus, *trial and error* emerges as a universal cognitive method, bridging empiricism and rationalism, observation and deduction, uncertainty and truth. It represents the fundamental dialectic of scientific thought: the continuous correction of reason by experience, and of experience by reason.

112.10. The Transcendence of the Trial-and-Error Method Beyond Experimentalism

Although the theory of *trial and error* first emerged within the framework of modern experimental methods, its *practical application* far transcends the confines of both experimental and quasi-experimental research. In fact, it can be applied across an *infinite range of scientific disciplines*, from the natural and social sciences to formal and synthetic systems. What is conventionally referred to as the *experimental method* is, in essence, a specific form of the *comparative method*, since experimentation fundamentally consists of comparison—either between the state of an object *before and after* experimental manipulation or, when available, between an *experimental group* and a *control group*. Thus, the trial-and-error approach extends beyond experimental design to represent a universal heuristic for scientific reasoning and evaluation, unifying empirical observation and logical contrast under a single methodological principle.

112.11. Comparison as the Core Structure of Experimentation

Every genuine experiment is built upon the act of comparison. When a medicine is administered to a patient—without a control group—the evaluation of its effectiveness depends on comparing the *patient's condition before and after treatment*. If recovery occurs, the result is attributed to the experimental variable, the medicine itself. Similarly, in the field of education, when a teacher replaces an ineffective teaching method with a new didactic approach and observes improvement in learning outcomes, the reasoning process is again comparative: the teacher evaluates the *difference in results* between the previous and current methods. In medical research, when both *experimental* and *control groups* are available, the comparison between the two groups reveals whether the treatment has a measurable effect. The same logic applies to educational experiments involving experimental and traditional classes. In all cases, the underlying epistemic structure is identical: *knowledge arises from the systematic comparison of outcomes before and after intervention* or between distinct conditions of application.

[In the specific case of education, educational innovation and educational quasi-experimentation are closely interconnected. Whenever a new content or methodology is introduced into the educational context, that innovation constitutes the new condition. What is then studied is the behaviour and performance of students under this new condition within the same context — the school.

What truly matters in educational innovation — and consequently in educational quasi-experimentation — is to regard the entire school as the core context. The context is not limited to the classroom; rather, the school as a whole constitutes the environment in which innovation and experimentation unfold. It is within this broader setting that students' behaviour occurs, and it is within this same environment that the introduction of new conditions leads to behavioural changes — which are precisely what we observe and analyze.]

112.12. Logical Comparison Between Hypotheses as a Form of Testing

The comparative essence of science is not restricted to applied or field experimentation—it also governs the logical testing of hypotheses. When a series of hypotheses are *logically deduced* from different sets of premises and each is tested in turn, what takes place is a *comparative evaluation* of the empirical consequences that follow from each hypothesis. The results obtained from each test are compared against one another and against empirical data, allowing the researcher to discard those that produce inconsistencies or excessive margins of error. Thus, *trial and error* operates as a rational framework for comparing hypotheses, mirroring the same comparative logic that underlies both experimental and analytical sciences. The process of *refutation* or *falsification*—central to modern scientific method—can therefore be understood as a particular manifestation of the broader comparative principle.

112.13. The Comparative Method as the Foundation of Synthetic and Analytical Sciences

In this sense, both *trial and error* and the *experimental method* can be considered variants or particular applications of the *comparative method* in modern science. As *Émile Durkheim* suggested, the comparative method functions as the methodological foundation of the social sciences, just as experimentation does in the natural sciences. Yet from a broader epistemological perspective, one might invert this relationship: ***the experimental method of the natural sciences is merely one form of the comparative method***, which in truth applies to *all synthetic sciences* and, arguably, to *analytical sciences* as well [It is within this framework that we must understand the outcomes of quasi-experimental research involving cutting-edge technologies in real settings]. Some interpretations even suggest that mathematics itself rests on a comparative foundation—on the detection of *quantitative similarities and differences*. When a mathematical operation equates or contrasts magnitudes, it engages in a form of logical comparison analogous to that used in empirical sciences. Consequently, the comparative principle appears as a *universal structure of reasoning*, encompassing observation, experimentation, and calculation alike.

112.14. Popper's Falsificationism and the Logic of Discovery

The historical association between trial and error and experimental methods during modernity should not obscure the deeper epistemological significance of the concept. If we define *trial and error* as the process of eliminating incorrect hypotheses, it becomes evident that this approach corresponds closely to what *Karl Popper* later called *the logic of scientific discovery*—that is, *falsificationism*. According to Popper, a hypothesis can only be regarded as *true provisionally*, as long as it has not yet been refuted by empirical evidence. The moment an observation or result contradicts the hypothesis, it must be abandoned. In this way, truth in science is always conditional and temporary, sustained

only until the emergence of error demonstrates the hypothesis's limits. From this standpoint, the trial-and-error process embodies the *self-correcting nature* of scientific inquiry: the progressive elimination of falsehoods through critical testing.

112.15. Trial and Error as the Logic of Synthetic Science

Ultimately, the concept of *trial and error* defines not merely a technique but the *logic of scientific progress itself*—especially within the domain of the *synthetic sciences*. Empirical hypotheses remain valid as long as they do not produce an unacceptable level of error relative to the critical standards of the scientific community. ***Once that threshold is exceeded, the hypothesis is refuted and replaced*** by a more accurate formulation. In this respect, the *trial-and-error mechanism* constitutes the very engine of theoretical evolution in science. All synthetic sciences—from physics and biology to psychology and sociology—operate through continuous cycles of conjecture, testing, and correction. Importantly, this process does not belong exclusively to *empiricist or inductivist* paradigms; it also functions within *rationalist and deductivist* frameworks, where hypotheses are generated by logical inference and subsequently subjected to empirical scrutiny. Thus, *trial and error* emerges as the universal epistemological process uniting rational deduction with empirical verification, ensuring that scientific knowledge evolves through the dialectical interaction of *reason, evidence,* and *error*.

112.16. The Synthesis of Contemporary Paradigms in *Impossible Probability*

In *Impossible Probability*, the methodological adoption of the trial-and-error principle arises from a deliberate *synthesis of the main philosophical paradigms of contemporary science*: *critical rationalism*, *positivism*, and *modern materialism*. From *critical rationalism* (as developed by Popper and his successors), the theory inherits the idea that knowledge advances through the logical testing and systematic refutation of hypotheses. From *positivism*, it adopts the principle that all valid knowledge must be empirically verifiable through controlled observation or experiment. And from *modern materialism*, it incorporates the awareness that ***Scientific practice is an ideological enterprise***

embedded within a broader political activity, shaped by institutional agendas, funding bodies, and the collective rationality of scientific communities. These communities include all actors with strong vested interests — from large corporations to civil society organizations, individuals and families [proletarius: the lowest census class under Servius Tullius, whose only contribution was his offspring.] whose economic interests are intertwined.

Under this integrated framework, knowledge is conceived as the *result of praxis*—that is, of active engagement and interaction with reality. Depending on the field of study, this praxis may take the form of the *experimental method* (in the natural sciences) or the *quasi-experimental/comparative method* (in the social sciences). Yet, even within these structures of control and verification, the process is always mediated by a *margin of rational doubt*. Science, according to this view, does not approach truth as an absolute entity but as a function of *critical rationality* operating within empirically testable conditions. Consequently, ***every act of experimentation is simultaneously epistemic and political—a manifestation of the institutional logic of what modern materialism calls scientific policy.***

112.17. Trial and Error as the Operational Logic of Scientific Testing

Although the expression *trial and error* generally denotes a universal *scientific logic*—a process by which refuted hypotheses are successively discarded—it has historically been associated most closely with the *experimental method*. In its specific form, trial and error represents a *sub-method* of experimentation: given a finite number of plausible hypotheses, and in the absence of any a priori logical or empirical determination, the only way to determine which one is most adequate is to test each through **systematic experimentation**. The method thus embodies the logic of empirical falsification: every hypothesis is true only insofar as it has not yet been contradicted by data. This is precisely the form of reasoning that underlies *Impossible Probability*, where the central objective of experimentation is not to prove absolute truths but to measure, compare, and minimize the *margin of rational error* within which scientific statements retain validity.

112.18. Experimental Applications in *Impossible Probability*

Concrete examples of the *experimental method* within *Impossible Probability* appear in *Section 10* of *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*. In this section, examples are provided for both *explanatory hypotheses* (those aiming to interpret observed phenomena) and *technological hypotheses* (those oriented toward practical applications and optimization). The experimental framework is employed to test the degree of empirical validity of each hypothesis through comparison, measurement, and verification—processes that directly correspond to the *trial-and-error dynamic* described earlier. In each case, the outcome of the test is not conceived as final but as *conditionally valid*—a momentary stabilization within a continuous process of correction and refinement.

112.19. Experimental Models: Equality of Opportunity and Bias Studies

The experimental examples presented in Section 10 of *Impossible Probability* include *studies on equality of opportunity* and *bias analysis*—both *positive bias* and *negative bias*—applied to *normal models* and *Omega models*. In these investigations, the trial-and-error process operates as an instrument for identifying which hypothesis produces an *error margin* consistent with *critical rational standards*. The evaluation does not aim to identify a hypothesis entirely free from error—since such a condition is logically impossible—but rather to isolate the one that produces the *smallest rational error*. Hence, truth is not treated as an absolute property but as a *relative state*, inversely proportional to the magnitude of its error. Mathematically and conceptually, the smaller the rational error, the higher the degree of relative truth assigned to the hypothesis. This relationship formalizes the probabilistic nature of knowledge itself within *Impossible Probability*, where *certainty* is always a limiting case, *never a permanent state*.

112.20. The Dynamic Refutation Cycle and Isomorphic Renewal of Hypotheses

Within this methodological framework, any hypothesis whose *potential error* becomes *actualized*—that is, empirically demonstrated—must be immediately *refuted and*

discarded. This moment marks not the end but the renewal of the scientific process. The refutation of a previous hypothesis constitutes the *empirical foundation* for the formulation of new hypotheses that are *more isomorphic*—that is, more structurally aligned with the observed reality. The process thus follows a continuous, self-correcting loop: from conjecture to testing, from testing to refutation, and from refutation to re-formulation. Each new hypothesis inherits the empirical content of its predecessor while attempting to reduce its margin of error. In this sense, *Impossible Probability* articulates a model of science as a *recursive system of rational self-correction*, governed not by the pursuit of absolute truth but by the progressive ***minimization of error through the dialectical interaction between theory and experience.***

Therefore, the theory of trial and error, as integrated within *Impossible Probability*, does not represent merely a procedural tool but the *epistemological structure of scientific evolution itself*: knowledge as iterative approximation, rational testing as political praxis, and truth as the asymptotic convergence between critical reason and empirical reality.

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113. Types of study

113.1. Definition of Study and Its Fundamental Types

In *Impossible Probability*, the term *study* refers to any systematic procedure designed for the *acquisition of new knowledge*. There are two fundamental categories of study depending on their purpose: (a) *scientific studies*, oriented toward the production of new knowledge for humanity as a collective, and (b) *learning processes*, oriented toward the improvement of individual knowledge by building upon the accumulated intellectual heritage of civilization. Scientific studies are characterized by their objective of expanding the human understanding of reality through structured methodologies, while learning represents the microcosmic reflection of that same process within individual consciousness. The distinction thus resides not in the essence of cognition but in its *scale* and *finality*—universal in science, individual in learning.

[In machine learning and artificial research, the distinction between learning and research remains valid, though it acquires deeper connotations within the Global Artificial Intelligence (GAI) framework. In artificial learning, the focus lies on self-enhancement and error elimination, whereas artificial research is directed toward understanding what is actually occurring in reality. In essence, learning concerns the process of self-improvement through adaptive decision-making and improving the pure reason as a taxonomy of mathematical/analytical categories, while research concerns the construction and continuous refinement of a coherent global model within the broader global project.]

113.2. Heuristic Methods and Their Philosophical Foundations

Scientific methods are collectively known as *heuristic methods*—that is, procedures designed to discover or generate knowledge. Their study falls under the domains of *philosophy of science*, *epistemology*, and *methodology*, all of which are ultimately grounded in *gnoseology*—the theory of knowledge itself. In the context of *Impossible Probability*, references to "types of study" always pertain to *scientific studies*, particularly those involving *statistics* and *probability*, whether in *descriptive* or *inferential* forms. The epistemological foundation of these methods lies in the synthesis between ***rational deduction and empirical observation***, where probability and statistics converge to describe and infer patterns from data. In this sense, *Impossible Probability* can be understood as a modern epistemological framework in which heuristic inquiry is mathematically formalized.

113.3. Philosophical Traditions and Theories of Knowledge

Across the history of philosophy, various schools of thought have produced competing definitions of knowledge, each leading to different scientific epistemologies. From the *idealists*, *rationalists*, *critical rationalists*, and *phenomenological* or *hermeneutic* schools, knowledge is viewed as arising from *mental or symbolic structures*, whether individual or socially shared. In contrast, *empiricist*, *materialist*, and *positivist* traditions assert that knowledge originates in *perception* or, in the case of *dialectical materialism*, in *praxis*—the active transformation of reality. Logical positivism, for its part, locates the origin of knowledge in *scientific activity* as the explanatory engagement with reality through observation and reasoning. Each philosophical perspective generates distinct conceptions of science, leading to diverse definitions of what constitutes *a scientific study*, its *methodology*, and its *teleology*—as well as different interpretations of the relationship between *science, ideology,* and *politics*.

113.4. Methodological Classifications: Qualitative and Quantitative Paradigms

From a methodological standpoint, one of the classical distinctions among study types lies between *qualitative* and *quantitative* approaches. *Qualitative methods* focus on the *interpretation of meanings, symbols,* and *social constructs*, emphasizing the role of mental and cultural frameworks in shaping understanding. *Quantitative methods*, by contrast, rely on *logical-mathematical procedures*, measurement, and statistical analysis to establish objective explanations of phenomena. Within the quantitative domain, two primary subtypes can be identified: *inductive methods* (deriving general principles from observation) and *hypothetico-deductive methods* (testing theoretical propositions against empirical data). This dichotomy between qualitative and quantitative inquiry reflects two complementary epistemic attitudes—*comprehension* through interpretation and *explanation* through measurement—both of which coexist in the synthesis proposed by *Impossible Probability*.

113.5. Additional Methodological Classifications and Subdivisions

Beyond this traditional distinction, studies can also be categorized according to the *specific methodological approach* employed. Major classifications include the *experimental method*, the *comparative method*, the *historical method*, the *stochastic method*, and the *trial-and-error method*. Within each of these, further subdivisions exist depending on whether the approach follows *quantitative* or *qualitative* logic. For example, within the comparative method, some researchers emphasize *quantitative evaluation* of differences, while others favor *qualitative interpretation* of historical or social constructs. The experimental method, on the other hand, remains the paradigm of quantitative precision, relying on direct measurement, control, and manipulation of variables. Thus, each classification not only defines a type of method but also expresses an *epistemological orientation* toward reality—empirical, rational, interpretative, or synthetic.

113.6. The Quantitative and Qualitative Foundations of Knowledge

In qualitative traditions, diverse methodologies share a common root: the belief that *mental structures* or *social constructs* mediate our understanding of reality. These approaches emphasize the subjective and intersubjective nature of meaning. Conversely, quantitative methods derive from paradigms that prioritize *sensory perception* and *observable phenomena*, asserting that knowledge depends on measurable facts and that *logical-mathematical operations* provide the only pathway to objectivity. In this context, *Impossible Probability* situates itself within the quantitative paradigm, yet transcends it by incorporating rational-analytical reasoning into its probabilistic models. It thus constitutes both a *quantitative science*—through its statistical procedures—and a *rational science*—through its emphasis on the critical interpretation of probability as a logical construct.

113.7. *Impossible Probability* as a Theory of Statistical Probability

Impossible Probability, defined as the *theory of the statistics of probability* or *statistical probability*, represents the synthesis between *statistics* and *probability*. It develops both *analytical* and *synthetic* methods grounded in mathematical logic. The analytical method, called the *syllogism of tendency*, involves the logical analysis of directional trends, while the synthetic methods are organized around the *Second Method*, *Impact of the Defect*, *Ranking Studies*, and *Effective Distribution*—each explained in the foundational work *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability* (Second Method – Section 5; Impact of the Defect – Section 21; Effective Distribution – Section 22). Together, these methods form a unified system for analyzing empirical variability and rational coherence within probabilistic models.

113.8. The Second Method and Criteria for Study Classification

In *Impossible Probability*, the *Second Method* provides the structural framework for classifying different types of studies. The classification depends on multiple criteria: the *purpose* (descriptive or inferential), the *model* employed, and the *object of study*. For inferential studies, additional distinctions are made according to the *critical probability margins* established by scientific policy—whether the study focuses on *error* or *reliability*. Hypothesis testing is thus framed as a *rational critique of the observed trend* within a given sample. Furthermore, studies ***may be classified*** according to their measurement structure: *single-measure studies* (*intrameditional*) or *multiple-measure studies* (*intermeditional*), with comparisons made either *intraindividually* or *interindividually*.

113.9. Universes of Limited and Infinite Options

According to *Impossible Probability*, there are two main types of *universes of study*: **(a)** *universes of limited options* and **(b)** *universes of infinite subjects or options*.

- In *limited-option universes*, the study focuses on the *distribution of frequencies* among a finite number of alternatives—denoted as *sample N*. This limitation may arise from natural constraints, social conventions, or *scientific policy* (which predetermines N).
    - Examples of *material limitations*: a coin toss (with only two outcomes, heads or tails) or biological sex (male or female, excluding rare hermaphroditic anomalies).
    - Examples of *socially determined limitations*: civil status categories (single, married, divorced, widowed) or occupational classifications established by law.

      In such studies, *empirical probability* is calculated as the frequency of

each option divided by the total frequency, representing the *behavior* of limited distributions.

- In *infinite-option universes*, by contrast, the focus is on the *direct scores* of subjects or options, treating each as a probabilistic entity. Empirical probability is defined as the ratio between an individual's direct score and the sum of all direct scores. When negative values appear in measurement scales, probability is calculated using the *absolute values* of scores—a correction introduced in the 2015 update of *Introduction to Impossible Probability*.

113.10. Sampling and Representativeness in Infinite Universes

In the case of infinite universes, studies are conducted on *samples* extracted from an indeterminate population. The *sample size N* must be sufficiently large and selected at random to ensure representativeness. In population studies, the entire *population may itself be treated as a sample*, since every population is a temporal cross-section of a potentially infinite continuum of occurrences. In this sense, each measurement represents one among infinitely many possible measurements of that population across its historical existence. The universe of study, therefore, encompasses not only the spatial dimension of the sample but also its *temporal and historical extension*, situating every empirical observation within the continuum of the universe's behavior over time.

[The statement *"a population may itself be treated as a sample"* is crucial for understanding our work in Madrid and London. While my case may initially appear to represent a singular case study, this is no longer accurate. One of the key components of our research involves observing how the broader population interacts with our technology once they become aware of its existence. The results obtained in London may therefore prove highly significant for the future global development of this technology, particularly as evidence of its impact and potential. Such findings could play an essential role in presenting a solid scientific and legal foundation before international institutions—such as the International Criminal Court—for the establishment of an appropriate legal framework governing Cyborg Robotics and the formal recognition of my condition as a cyborg.

By the time that moment arrives, the main issue will concern the wrong decisions made by certain British institutions, which failed to follow the proper legal and conventional pathways necessary to provide appropriate support. If I now understand who I am, it is only because this journey has not been free from personal pain, torture, and sacrifice.

When that moment comes, my hope is that the International Criminal Court will understand that none of this is my fault. I did not choose to become a cyborg; I was used, from birth, in military experimentation, involving physical control of the mind and military brain wash. No one ever asked me whether I consented to this, nor was my mother ever asked if this was what she wanted for me. In truth, I do not even know who my real mother is. What must be investigated, and how many children were used, and how many did not survive, ***possibly I am the only survivor***.]

113.11. Descriptive and Inferential Studies

Regardless of whether the ***universe under study is limited*** or infinite, research can be either *descriptive*—focused on observing and describing tendencies—or *inferential*—aimed at validating an empirical hypothesis through the *hypothetico-deductive method*.

- In *descriptive studies*, statistical tools include individual and sample-level indicators: *empirical probability*, *theoretical probability*, *bias level (Nivel de Sesgo)*, and measures of dispersion such as *mean deviation* or *standard deviation*.
- In *inferential studies*, by contrast, the purpose is to generalize results to the entire universe represented by the sample. Here, probability theory becomes the logical foundation for deciding whether a hypothesis can be *provisionally accepted* as rational and universal within defined critical margins.

113.12. Models: Normal and Omega Structures

In inferential studies, *Impossible Probability* distinguishes between two primary model types: **normal models** and **omega models**.

- In *normal models*, dispersion ranges from zero to its maximum. These studies typically address *equality of opportunity* or *bias* (positive or negative). A study of *equality of opportunity* seeks to minimize empirical dispersion by aligning all subjects' probabilities toward the *theoretical probability of occurrence* (1/N). Conversely, a *bias study* focuses on increasing dispersion***. If only one subject or option is elevated to the maximum empirical probability, the study is classified as positive bias***, while the attempt to reduce all non-ideal probabilities to zero constitutes a *negative bias* study.
- In *omega models*, a subset of *ideal subjects or options*—denoted as Ω—is defined within N. Each element of Ω should converge toward the *ideal probability* (1/Ω). The omega model thus generalizes the study of bias and equality by introducing structured ideal subsets within the universe.

113.13. Rational Critique and the Validation of Hypotheses

For any empirical hypothesis to be considered *rationally valid*—that is, *universally and provisionally true*—it must withstand *rational critique* at both the individual and sample levels.

- At the *individual level*, the analysis evaluates whether each subject's or option's *bias level* aligns with the theoretical ideal defined by the object of study.
- At the *sample level*, the analysis confirms that the observed dispersion corresponds to the model's objective and not to random sampling error.

Inferential studies may involve *intra-measurement* (intrameditional) or *inter-measurement* (intermeditional) comparisons, which can be intraindividual or interindividual, intramuestral (within-sample) or intermuestral (between-sample). ***These comparative structures allow the study of evolution across measurements, individuals, or even different sampling contexts, providing a multidimensional framework for the rational evaluation of empirical tendencies.***

[At some point, all of our work is contained within every single line and word of my books. The only thing the reader must do is read carefully—because the truth is in plain sight.]

113.14. The Comprehensive System of Study Types in *Impossible Probability*

The ***classification*** of study types in *Impossible Probability* thus integrates multiple dimensions:

- **Universe**: limited or infinite.
- **Object**: subject or option.
- **Statistical approach**: descriptive or inferential.
- **Model type**: normal or omega.
- **Object of study**: equality or bias (positive or negative).
- **Comparative structure**: intrameditional or intermeditional, intraindividual or interindividual, intramuestral or intermuestral.

This multidimensional taxonomy, detailed in the 2015 updated edition of *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*, also incorporates the *treatment of direct scores with negative signs*. Together, these criteria form a comprehensive scientific system for structuring research within *Impossible Probability*, uniting logical, statistical, and probabilistic reasoning into a coherent methodological architecture that bridges ***rational critique and empirical observation.***

This augmented translation is based on the post
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Rubén García Pedraza
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114. Probability one

114.1. “Probability One” as the Upper Bound of Possibility

Probability one denotes the maximal probability assignable to any event. Because probability is a *rational estimator* of the degree of possibility—“rational” insofar as it is expressed by a rational number, a mathematical ratio—it ranges on the closed interval $[0,1]$. Thus, $p = 0$ signifies impossibility (within the model), whereas $p = 1$ expresses *determination* or *certainty*: if an event bears probability one, it occurs in every admissible realization of the model (abstracting from factual error).

114.2. Classical Ratio and the Certainty Limit

In classical statistics, probability is defined as the ratio of *favorable cases* to *all possible cases*. Consequently, $p \in [0,1]$. The lower bound, $p = 0$, represents the minimal degree of possibility; the upper bound, $p = 1$, represents certainty. A model that assigns $p = 1$ to an event treats its occurrence as necessary (again, modulo extra-model contingencies).

114.3. The Second Method in *Impossible Probability*: A Reframing of Probability Types

Within the Second Method of *Impossible Probability* (the statistics **of** probability / statistical probability), traditional notions are refined by distinguishing:

- **Empirical probability** $p(x_i)$,

- **Theoretical probability** (typically $1/N$ under equal chances),
- **Ideal probability** (e.g., $1/\Omega$ in omega models),
- **Critical probability** p_c(used for decision thresholds in hypothesis tests).

114.4. Which Probabilities Can Reach Unity?

Among these, only **empirical probability** and **critical probability** can attain the value 1. Theoretical and ideal probabilities are bounded away from 1 under genuinely stochastic conditions (see §§114.18–114.19).

114.5. Critical Probability: Definition and the Condition for $p_c = 1$

In *Impossible Probability*, **critical probability** is computed as the product of a *reliability percentage* X(or, dually, an *allowed error*) and a model's **maximum empirical trend** $T_{\max}$:

$$p_c = \frac{X}{100} T_{\max}.$$

Hence, $p_c = 1$ is possible **only** in a **reliability** framework when $T_{\max} = 1$ and $X = 100\%$. In words: a model is accepted only if it achieves its own maximal empirical trend with perfect required reliability.

[Only we have critical probability equals one, p(xc)=1, when there is no critical margin of error, there is only factual error, only sample error equal to the inversion of the sample.]

114.6. Models With $T_{\max} \neq 1$and Critical Estimation

For models whose **maximum trend** is *not* unity, like in the critical probability in omega models where normally the X percentage of error or reliability is multiplied by the ideal probability of ideal dispersion, the hypothesis tests remain the same, no further changes, in omega contexts are applied omega conditions to study the behaviour of omega

subjects whose aim is not to become maximum values, only ideal values according to the inversion of omega.

114.7. Practical Reliability: Allowing Small Error Margins

In practice, reliability thresholds are rarely set at 100% unless *any* error is intolerable. Typically, a small *error margin* is admitted, so that

$$p_c \;=\; \frac{X}{100}\,T_{\max} \;<\; T_{\max} \le 1,$$

and any empirical outcome $\geq p_c$is accepted as rationally sufficient within the declared *critical margin of error*.

[Normally, in error studies, empirical values are equal to or less than the critical value, which is calculated as a percentage of the error coefficient (*X* error) multiplied by the maximum or ideal tendency. Conversely, in reliability studies, empirical values are equal to or greater than the critical value, which is determined as a percentage of the reliability coefficient (*X* reliability) multiplied by the maximum or ideal tendency.]

114.8. Error-Framed Studies and Minimal Trends

In **error studies**, the ideal is to accept the *lowest* possible empirical trend over the *maximum trend* (treating any positive trend as error). The theoretical lower bound corresponds to 0%error, i.e., $(0/100)\cdot T_{\max} = 0$. Operationally, however, a minimal nonzero error margin is usually specified; any empirical trend $\leq$that margin is accepted.

114.9. Families of Intrameditional Critical Tests

The repertoire of **critical-probability models** for **within-measurement** (intrameditional) designs is presented from §11 of *Introduction to Impossible Probability* (2015 update), including procedures for **negative** direct scores. Only a small subset is summarized here; the formal catalogue is broader.

114.10. Empirical Probability in the Second Method and the Case $p = 1$

In the Second Method, **empirical probability** for a subject or option is defined by **absolute** direct scores or frequencies:

$$p(x_i) \;=\; \frac{|\, x_i \,|}{\sum_j \;\; |\, x_j \,|}.$$

Therefore, $p(x_i) = 1$, **if** *exactly one* subject/option bears a **nonzero** direct score and **all others are zero**; equivalently, that single unit carries the entire mass of the sample.

114.11. Limited vs. Infinite Universes and the Attainment of Unity

- In **limited-option universes**, $p(x_k) = 1$ occurs when the **frequency** of option k equals the **total frequency**.
- In **infinite subject/option universes**, $p(x_k) = 1$ requires a **single** nonzero direct score and zeros for all others in the sampled set.

114.12. Maximum Empirical Probability Possible (MEPP)

No empirical probability can exceed 1. When $p(x_i) = 1$, *Impossible Probability* names it the

$$\text{Maximum Empirical Probability Possible (MEPP)} \;=\; 1.$$

114.13. Bias at the Ceiling: MTBP, MEBP, and Total Bias

Under MEPP, only one unit has nonzero probability. Let N be the sample size and $p_{\text{theor}} = 1/N$ the *theoretical* probability (equal chances). Then:

- **Maximum Theoretical Bias Possible (MTBP)** for the favored unit:

$$\text{MTBP} \;=\; 1 - \frac{1}{N}.$$

- Define **Total Bias** as the sum of absolute individual biases:

$$\text{Total Bias} \;=\; \sum_{i=1}^{N} \;\; \left| \; p(x_i) - \frac{1}{N} \; \right|.$$

- **Maximum Empirical Bias Possible (MEBP)** is half the Total Bias:

$$\text{MEBP} \;=\; \frac{\text{Total Bias}}{2}.$$

114.14. When Does an Individual Bias Reach MEBP?

An individual's **bias** reaches the empirical maximum precisely when:

1. that individual's bias equals the **theoretical maximum** $1 - \frac{1}{N}$(the only **positive** bias in the sample), and
2. the remaining $N - 1$units bear **negative** biases whose **absolute sum** equals $\frac{N-1}{N} = 1 - \frac{1}{N}$.
   Hence the identity:

$$1 - \frac{1}{N} \;=\; \frac{1}{N}\,(N-1)$$

The **maximum absolute negative bias per unit** in this configuration is $\frac{1}{N}$.

114.15. Positive–Negative Compensation and Absolute Deviations

Because, outside of "all-zeros" edge cases, **positive** and **negative** deviations must **balance** in total, dispersion metrics rely on **absolute** deviations (otherwise the algebraic sum vanishes). Under MEPP (maximum dispersion), we therefore obtain:

$$\text{MTBP} = \text{MEBP} = \frac{\text{Total Bias}}{2}.$$

This is the canonical *maximum-dispersion* profile: only one empirical probability differs from zero.

[If only one subject or options is non zero, the **Maximum Theoretical Bias Possible** es equal to the **Maximum Empirical Bias Possible**]

114.16. Consequence for Sample Dispersion

In such extreme configurations, sample dispersion measures (Mean Deviation, Standard Deviation) necessarily approach their **maximum theoretical values** (Maximum Theoretical Mean Deviation Possible; Maximum Theoretical Standard Deviation Possible).

114.17. Why the Maxima Matter: Setting Critical Margins

Knowing the maxima—**MEPP**, **MTBP**, **MEBP**, and the **maximum theoretical dispersions**—allows scientific policy to set **critical margins** for hypothesis testing (**critical probabilities**) that are both stringent and model-appropriate. These maxima anchor the *rational critique* by calibrating acceptable error or reliability thresholds.

114.18. Positive-Bias Normal Models vs. Omega Models

If the ideal of a model is that **exactly one** unit in Nachieves MEPP ($p = 1$), we have a **normal model of positive bias**. By contrast, **omega models** (Ω)designate a subset of **ideal** units, with $1 < \Omega < N$. The **ideal probability** for each ideal unit is $1/\Omega$, which is **never** 1. When all ideal units attain $1/\Omega$, dispersion tends toward an **ideal dispersion** (Ideal Mean/Standard Deviation), rather than maximum dispersion.

114.19. Why Theoretical Probability Can Never Be One in Stochastic Models

Theoretical probability $1/N$ functions as a *central tendency* (the arithmetic mean of empirical probabilities, and probability of equal opportunities). In any genuinely stochastic model, $N > 1$, so $1/N < 1$. Therefore, theoretical probability cannot equal unity.

114.20. Empirical Probability One and Practical Certainty (with Factual Error Caveat)

When a unit's **empirical probability** equals 1, its phenomenon is certain *within the model*. For instance, a *biased coin* that always lands "heads" (barring incidental physical anomalies) exhibits $p(\text{heads}) = 1$ and $p(\text{tails}) = 0$, conferring practical certainty subject to *factual error* (see §114.21).

114.21. "Error of Fact" as Representativeness Error

Impossible Probability calls *error of fact* the irreducible error entailed by accepting *partial reality* through *samples*. Since we only ever observe **parts** of reality, the *representativeness error* is:

- In **infinite** subject/option universes: $1/N$ (inverse of sample size).

- In **limited-option** universes: $1/\sum_i$ (inverse of the total direct scores/frequencies).

  Thus, *certainty within the model* (e.g., $p = 1$) remains subject to this external representativeness bound.

114.22. On Inversion Logic and Theoretical Dispersion

The logic of $1/N$ **inversion**, its relationship to **theoretical dispersion**, and the role of **error of fact** are developed for *infinite universes* in Section 5, and for *limited-option universes* (via direct scores/frequencies) in Section 9 of *Introduction to Impossible Probability*.

114.23. Locating Probability-One Phenomena Within Bias Studies

Phenomena tending toward **MEPP** ($p = 1$) fall, in *Impossible Probability*, under **bias studies**, specifically **positive bias**. Their validation requires **hypothesis-contrast tests** at both the **individual** and **sample** levels to verify that the observed tendency is sufficiently reliable relative to the critical margins. Only then may such tendencies be provisionally accepted within the discipline's rational-critical framework.

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115. Object of study

115.1. What is the "Object of Study"? Scope, Title, and Central Theme

The *object of study* answers the question *what is being studied*—the focal domain around which an investigation is organized and which is usually encapsulated in the title. Whether we analyze the chemical composition of the atmosphere, pre-election voting tendencies, or the grammatical structure of a language, that focal domain constitutes the object. In synthetic sciences that employ the hypothetico-deductive method, the object of study is typically synthesized in the *empirical hypothesis* that the research sets out to test.

115.2. "Object" versus "Subject": A residual dialectic

Calling it an *object* of study does **not** require that it be a physical object. The term preserves a residue of the classical *subject–object* dialectic (with Hegelian overtones) that modern science inherited: the *subject* is the investigator (or research team) and the *object* is whatever is investigated—material, symbolic, or structural.

115.3. Criteria for Classifying Objects of Study in *Impossible Probability*

In *Impossible Probability*, the classification of objects of study follows criteria that descend from *critical rationalism*, distinguishing between:

1. **Analytical sciences** (formal objects), and
2. **Synthetic sciences** (empirical objects).
   This divide determines both the kind of questions asked and the admissible methods of validation.

115.4. Objects in Analytical Sciences: Formal and Structural

Analytical sciences typically address *abstract* objects—logical-mathematical or linguistic structures—either to understand them or to extend them. Examples include developing new mathematical formalisms and codes; analyzing or engineering grammatical systems; or adapting pictographic logics to emergent symbolic codes in digital culture (e.g., the semantics and syntax of emoji systems in social networks).

115.5. The Analytical Program: From Logical Positivism to Formal Methods

Heirs to the legacy of logical positivism, the analytical sciences focus on *formal language analysis*—mathematical logics and natural languages (ancient or modern), and even, in broader postmodern frames, formal analyses of art. Qualitative analytical models deploy *interpretive* methods; quantitative analytical models emphasize the development of *logic and mathematics*. Many techniques that later guide synthetic sciences—such as *statistics* and *probability*—emerge from this analytical tradition.

[In this blog, the strong influence of neopositivism is very clear. I especially recall how deeply it shaped my thinking during my PhD years—I still remember spending about an hour at night reading Carnap. The influence was profound, and it remains evident in how much importance I place on defining basic scientific and philosophical concepts. It is upon these precise definitions that a more solid structure can later be built, much like the scaffolding described by Ausubel. In fact, Ausubel's theory of meaningful learning and the principles of neopositivism are not as far apart as they may initially seem.]

115.6. Objects in Synthetic Sciences: Empirical and Mixed (Formal–Material)

Synthetic sciences study *empirical* objects. Even when qualitative hermeneutics is used to interpret meaning, quantitative approaches prioritize *logical-mathematical analysis* of observed facts to derive *synthetic propositions* (formal structures applied to material

data). Quantitative synthetic models divide into *inductivist* and *deductivist* traditions. In the latter, the *empirical hypothesis* names the true object of testing.

115.7. The Place of *Impossible Probability* within Statistical Probability

Impossible Probability—the theory of the *statistics of probability* (statistical probability)—combines **analytical development** and **synthetic application** of statistics and probability. On the synthetic side, it supports both **descriptive** and **inferential** studies aimed at a *rational critique* of empirical hypotheses.

115.8. The Analytical Method: The Syllogism of Tendency

For analytical development within *Impossible Probability*, the method is the *syllogism of tendency*—a logical analysis of how trends behave. Example: from analyzing the relation between N and its inversion $1/N$, we deduce the analytical proposition:

$$\text{as } N \to \infty, 1/N \to 0.$$

115.9. Synthetic Methods Derived from the Analytical Core

From this analytical foundation, *Impossible Probability* constructs synthetic methods that apply *tendency analysis* to empirical phenomena: the **Second Method**, **Ranking Studies**, **Impact of the Defect**, and **Effective Distribution**. These serve (a) description of reality and, at a higher level, (b) *inference*: the rational validation of synthetic propositions in the form of empirical hypotheses.

115.10. Descriptive Phase: Object as Tendency Identification

When the object in synthetic sciences is *descriptive*, and no prior hypothesis is assumed, the object of study is the *identification of the tendency* exhibited by samples drawn from a universe. Once a tendency is extracted, the researcher synthesizes it with extant

theories and model premises to deduce an empirical hypothesis explaining what was observed. Such a hypothesis can only be accepted *rationally, universally, and provisionally* after surviving *hypothesis-contrast* (critical tests).

115.11. Hypothetico-Deductive Orientation: The Hypothesis as Object

Because *Impossible Probability* employs a *quantitative, hypothetico-deductive* methodology, the object of research is synthesized in the *empirical hypothesis*. Validation is logical-mathematical: the hypothesis must explain the observed tendency and withstand testing. Thus, the immediate object becomes: (1) *describe* the tendency; (2) *deduce* the hypothesis from description and paradigm premises; (3) *test* whether the hypothesis is (provisionally) correct for the entire universe.

115.12. A Constant Across Phases: The Object is Always the Tendency

At every stage—initial *description* or higher-order *inference*—the object of study is the *tendency*: first, to *identify* it; secondly, to *explain and finally test* it through a hypothesis that synthesizes observation with prior ideas.

115.13. The Object of Study in the Second Method: Always the Tendency

Accordingly, in statistical probability under the Second Method, the true object is *the study of tendency*. *Introduction to Impossible Probability* (notably from §10) speaks of the object of study as the *possible forms of tendency* in sample and universe:

- In **normal models**: *equality* or *bias* (positive or negative),
- In **omega models**: *tendency to the ideal probability* for the set of ideal subjects/options in the omega subset ($1 < \Omega < N$).

115.14. Equality of Opportunity as a Tendency (Normal Models)

A study of **equality of opportunity** posits as its ideal (set a priori by scientific policy) the convergence of all empirical probabilities toward the *theoretical probability of occurrence under equal chances*, i.e., the inversion $1/N$. This is the canonical definition of equality in statistical probability.

115.15. Dispersion Behavior under Equality: Individual and Sample Levels

If equality is the ideal, *dispersion* should *decrease*:

- **Individually**: generalized declines in *Bias Levels* (Nivel de Sesgo),
- **At the sample level**: a decline in *Mean Deviation* or *Standard Deviation*. Hypothesis tests therefore require Bias Levels $\leq$an **Equality Validity** margin and sample dispersion $\leq$a **Critical Sample Level of Equality**.

115.16. Positive-Bias Studies in Normal Models: Maximum Dispersion Case

In **positive-bias** studies (normal models), to achieve *Maximum Theoretical Bias Possible* it must be the case that *exactly one* subject/option accumulates *all* direct scores/frequencies. Examples: (i) in a multiple-choice exam, every student selects only the correct option for each item (so the correct option's frequency equals the total); (ii) in an election, *every* voter selects the same candidate. In such cases, with one nonzero unit and all others zero, dispersion reaches its maximum theoretical bounds (Maximum Theoretical Mean/Standard Deviation). Verification proceeds by analyzing dispersion: either the ideal unit's Bias Level $\geq$a **Positive Bias Validity** margin, or the sample dispersion $\geq$a **Critical Sample Level of Bias**.

115.17. Coupling Positive and Negative Bias

Positive-bias studies can be paired with **negative-bias** analysis: as the single ideal unit's positive bias increases, the number of units with negative bias must grow correspondingly. Those units must display *negative* Bias Levels ≥a **Negative Bias Validity** margin (in absolute terms).

115.18. Omega Models: Ideal Subsets and Ideal Probability

In **omega models** (Ω), for $N > 2$there exists a subset of *ideal* subjects/options defined by scientific policy. Examples: multiple adequate answers per item in a lifestyle survey; more than one ideal candidate/delegate in a political selection, each desirably increasing equally; or any analogous situation where more than one (but not all) options are normatively ideal. The ideal tendency is convergence to the **ideal probability** $1/\Omega$. Validation criteria include:

- **Omega Validity** (individual): Bias relative to omega, $p_{\text{emp}} \geq$ reliability margin;
- **Omega Sample Level** (aggregate): sample dispersion consistent with the omega ideal.

115.19. Validity and Sample-Level Criteria: The Catalogue of Tests

Equality Validity, **Positive/Negative Bias Validity**, **Omega Validity**, **Critical Sample Level of Equality**, **Critical Sample Level of Bias**, and the **Omega Sample Level** are detailed in §11 of *Introduction to Impossible Probability* (2015 update, including treatment of negative direct scores). §11 also includes intrameditional rational-critique models (e.g., **Critical Proportions**, **Probability of Equality/Positive Bias/Negative Bias**) and procedures for assessing sampling reliability; §15 adapts **Point Bias** to standardized scores; §§16–20 develop **intermeditional** critique models.

115.20. The Final Reduction: The Object as Dispersion of Statistical Probabilities

In *Impossible Probability*, the deep object of study in statistical probability is *tendency as dispersion behavior*. Lower dispersion indicates a stronger *tendency to equality of*

opportunity; higher dispersion indicates *bias*. If the increased bias belongs to ideal subjects/options, we speak of *positive bias*, the normative target of increase. Two regimes follow:

1. **Normal model**: a single ideal unit—tendency toward *maximum empirical dispersion* as that unit approaches the *Maximum Theoretical Bias Possible*;
2. **Omega model**: a set of ideal units $(1 < \Omega < N)$—tendency toward *ideal probability* $1/\Omega$ and, therefore, *ideal dispersion*.

Once the object is defined as *tendency*, and tendency is operationalized via *dispersion*, the operative conclusion is clear: **the object of study is the dispersion of statistical probabilities**—its reduction under equality ideals and its augmentation under bias ideals, as specified by scientific policy and tested through the rational-critical apparatus of *Impossible Probability*.

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116. Probability zero or Impossible Probability

116.1. Probability as a Rational Magnitude of Possibility

Probability is the *rational magnitude* of a degree of possibility—*rational* because it is measured by a ratio (a mathematical quotient). By construction it ranges on $[0,1]$. Traditionally, $p = 1$ denotes certainty, and $p = 0$ denotes impossibility. In *Impossible Probability*, *probability zero* is identified with **Impossible Probability** and plays a central, formally developed role (see the January 2015 update of *Introduction to Impossible Probability: Statistics of Probability / Statistical Probability*).

116.2. The Classical Ratio and Its Historical Origin

Classical statistics defines probability as

$$p = \frac{\text{favorable cases}}{\text{all possible cases}},$$

a formulation historically shaped by early modern wagering problems commissioned to mathematicians. While pre-modern states developed counting techniques (proto-statistics) through censuses, the *mathematical* theory of probability matured from gambling analysis. Hence the long persistence of the "favorable cases" ratio.

116.3. A Fusion Perspective: Statistical Probability in *Impossible Probability*

Against the classical separation of "statistics" and "probability," *Impossible Probability* proposes their synthesis as **statistical probability** (the *statistics of probability*). Within this field, core probabilistic notions are redefined to align measurement, inference, and decision.

116.4. The Second Method versus the First (Classical) Method

The **Second Method** in *Impossible Probability* complements (and can substitute for) the traditional or **First Method**. The Second Method yields a refined taxonomy of probabilities:

- **Empirical probability** $p(x_i)$,
- **Theoretical probability** (typically $\frac{1}{N}$ under equal chances),
- **Ideal probability** (e.g., $1/\Omega$ in omega models),
- **Critical probability** p_c(decision threshold in inference).

[What I mean by the **First Method** is the strict application of traditional statistics and traditional probability as separate disciplines within the broader science of mathematics. By contrast, the **Second Method** we propose is a synthesis of both into a single framework. We already know that the concept of **statistical probability** has existed in mathematics for quite some time. For example, **John Maynard Keynes**—not only a brilliant economist (in our view, with strong left-wing influences) but also a contributor to statistical probability—has been credited by some authors as one of the first to use the term *statistical probability*.

Our contribution is to propose the study of **statistical probability as a discipline in its own right**. Whereas Keynes and others treated statistical probability primarily as a concept, Keynes did not propose it as a standalone discipline. This is the key difference and the reason we speak of **statistical probability**—or **statistics and probability**—as an integrated field. These statistics can include, for example, **inversion of the sample N** ($1/N$), inversion of the **samples of direct scores and frequencies, 1/Σxi**, and the identification of **maximum and minimum theoretical or empirical statistics**. This is one of our most important contributions.

Even if we are "cancelled" in London—which, for me, is not really a problem—I know who I am and how important this work is, not only in mathematics but also in **physiology**,

cyborg technology, **artificial intelligence**, and **Global AI**—in brief, **cyborg military strategy**. What truly matters is not whether I am cancelled; I would not be the first scientist to face such opposition. What matters is the advancement of **philosophy and science**, and the development of a radical, revolutionary **transhumanist** agenda. In the end, what the media calls a "woke agenda" is, in essence, a **transhumanist** agenda: the construction of an **advanced AI civilization**—the **AI Revolution**—a non-human civilization in which humans have the opportunity to embrace the **Cyborg Revolution** simply to survive.]

116.5. Where Can Probability Be Zero

Among these, only **empirical** and **critical** probabilities can equal **zero**.

- **Theoretical probability** $1/N$ cannot be 0 in a genuinely stochastic model because $N > 1$ (otherwise no sample exists).
- **Ideal probability** $1/\Omega$ cannot be 0 in an omega model, because $\Omega \geq 2$ and $\Omega < N$. If $\Omega = 0$, there is no omega subset; if $\Omega = 1$, the case collapses into a normal positive-bias model; if every option is "ideal," the model is equality (not omega).

116.6. Critical Probability and the Zero–Error Limit

Critical probability represents the *critical margin* adopted by scientific policy in inferential testing. In *Impossible Probability*:

$$p_c = \frac{X}{100}\, T_{\max},$$

where X is the tolerable **error** (or, dually, **reliability**) percentage, and $T_{\max}$ is the model's **maximum empirical trend**.

- In **error studies**, the lower the accepted error, the lower p_c.

- $p_c = 0$ occurs *only* if policy tolerates **0% error** and the criterion is expressed as a margin on the maximum trend. The slightest empirical error then triggers *automatic rejection*.

[In any case even if the critical probability is zero, the sample error quals the inversion of the sample remains.]

116.7. Practical Policy: Nonzero Tolerance

In practice, scientific policy almost always admits a minimal, nonzero error margin. Thus $X > 0$ and typically $p_c > 0$. Models with outcomes meeting or within the declared critical standard are accepted as *provisionally rational*.

116.8. Empirical Probability in the Second Method

Under the Second Method,

$$p(x_i) = \frac{| x_i |}{\sum_j \quad | x_j |},$$

where $x_i$is the direct score/frequency for subject/option i(absolute value is used when scales admit negative numbers). Hence $p(x_i) = 0$ if $x_i = 0$.

116.9. How $p = 0$ Arises in Limited and Infinite Universes

- **Limited-option universes**: $p(\text{option}) = 0$ when that option's frequency is **absent** in the distribution.
- **Infinite subject/option universes**: $p(x_i) = 0$ when the measured **direct score** is **zero** for subject/option i.

116.10. Empirical Zero as (Model) Impossibility—With a Caveat

Thus, empirical probability **zero** means: in limited universes, **non-occurrence** of the option; in infinite universes, **non-manifestation** of the quality in that subject/option. *Modulo the caveat below*, this encodes *impossibility within the model*. However, as discussed in §7 of *Introduction to Impossible Probability*, under a truly infinite universe, logical coherence permits scenarios where what is presently "impossible" may become *inevitable* in extended horizons.

116.11. The "Error of Fact" (Representativeness Error)

Because we only observe *samples* of reality, predictions inherit an **error of fact** (representativeness error):

- Infinite universes: $P(\text{representativeness error}) = 1/N$.
- Limited-option universes: $P(\text{representativeness error}) = 1/\sum_i \quad x_i$. Hence, statements like "$p = 0 \Rightarrow$ impossibility" hold **except for** this representativeness margin.

[If, in a sample, a subject or option has no frequency or no score, this does not mean that the same subject or option will repeat the same behavior under different conditions or contexts. Likewise, if no subject or option in a sample exhibits a behavior—or if the observed behavior is the absence of a certain behavior—this does not imply that, in the entire universe, there is at least one subject or option with that behavior absent from the sample. Even when a subject or option has zero probability in a sample, or when the entire sample is zero, the results remain subject to the sample's attached error—the representativeness error. In other words, sample error is always unavoidable, at least until we create an intelligence capable of scaling to such volumes of data that sample error is practically eliminated, or even capable of working with the entire universe—like a Demiurge rolling the dice.]

116.12. Example: Symptoms Reduced to Zero

Suppose symptom intensity is measured on a magnitude scale (direct score). After treatment, a patient's symptom score becomes 0. If scientific policy demands **0% error** (100% reliability), the model predicts *impossible* recurrence of symptoms—**except** for the *error of fact* that attends any finite sampling of histories.

[In medical research, even if a new treatment reduces symptoms to zero for all patients in a study—and is therefore commercialised—this does not guarantee the same results at the population level. The treatment may interact with very specific patient conditions and produce fatal consequences. Even when laboratory results appear 100% reliable, a study sample is still only a sample, not the universe of cases. In the broader population, there may be conditions and contexts in which the variable behaves unexpectedly due to sampling error.

Regarding the technology I carry, although I have achieved what I believe are excellent results—not only because **Ruben García Pedraza** tolerates this technology and can perform certain operations with great accuracy—this does not mean the technology is market-ready, despite what many in London believe. Our view is clear: **Ruben García Pedraza** alone is not sufficient to justify commercialisation. We need a broader sample and a robust legal framework authored by the **International Court of Justice**, approval from the **World Health Organization**, and an assessment of the military consequences by the **Security Council**. Only then would we have a clear legal basis to conduct large-scale experimentation leading to commercialisation. This is the most important mission of **Impossible Probability** at present. If we reach this goal, we can offer lawful cyborg technology for civilian purposes (e.g., medical treatments), legal civilian artificial telepathy, and military cyborg programmes. Achieving this target would also position us, once superintelligence permits, to integrate civilian and military cyborg systems with a global AI—potentially inaugurating the first advanced cyborg society in history.]

116.13. Minimum Empirical Probability Possible (MEPP_\min)

Because empirical probabilities cannot be negative, the minimum attainable value is

$$\text{Minimum Empirical Probability Possible} = \boxed{0}.$$

(When direct-score scales admit negative values, empirical probabilities are computed with absolute scores to preserve nonnegativity.)

116.14. Consequence for Bias: Maximum Negative Bias Possible

If *Bias Level* is defined by

$$\text{Bias}_i = p(x_i) - \frac{1}{N},$$

then for any case with $p(x_i) = 0$:

$$\text{Bias}_i = 0 - \frac{1}{N} = -\frac{1}{N}, \Rightarrow |\ \text{Bias}_i\ | = \frac{1}{N}.$$

Therefore, the **absolute Maximum Negative Bias Possible** equals $\boxed{1/N}$.

116.15. Negative-Bias Studies and Their Compatibility

In **normal models**, validating *positive bias* for a single ideal unit (driving it toward $p = 1$) necessarily entails that the remaining $N - 1$ units trend toward $p = 0$ (*negative bias*). In **omega models**, as the Ω ideal units move toward *ideal probability* $1/\Omega$, non-ideal units tend toward $p = 0$, increasing their negative bias correspondingly. Thus positive- and negative-bias tests are jointly informative.

116.16. Why Use Absolute Deviations? Total Bias and Dispersion

By the "natural compensation" of deviations, total positive bias equals total negative bias (outside degenerate all-zero cases). Hence dispersion is computed from *absolute* deviations:

$$\text{Total Bias} = \sum_i \left| \; p(x_i) - \frac{1}{N} \; \right|.$$

Classical statistics circumvents sign cancellation via squaring (yielding the standard deviation). *Impossible Probability* recommends **Mean Deviation** to preserve the magnitude of differentials as directly and transparently as possible.

116.17. Joint Designs: Tracking $p \to 1$ and $p \to 0$

Combined studies can simultaneously test:

- In **normal positive-bias** models: the focal ideal unit's trend $p \to 1$ and the complementary trend $p \to 0$ for all others.
- In **omega** models: the move of ideal units toward $1/\Omega$ and the move of non-ideal units toward 0.

These designs presuppose at least one ideal unit (normal,) or in omega models the number of ideals is $2 \leq \Omega < N$. If *all* units are equally ideal ⇒ equality model; if *none* are ideal and the ideal is zero score ⇒ **all-zeros sample**.

116.18. The All-Zeros Sample: A Structured "Paradox"

In an all-zeros sample, each empirical probability averages to 0. Yet dispersion—measured relative to **theoretical probability** $1/N$—is **nonzero** in absolute terms: individual bias magnitudes and the sample's Mean/Standard Deviation equal $1/N$. This

reflects the Second Method's core: dispersion is assessed relative to the *theoretical equal-chance baseline* $1/N$, which is the arithmetic mean of empirical probabilities **except** in the all-zeros case.

[In a sample of zeros, 1/N= theoretical probability, but it is not arithmetical mean as long as the mean is zero.]

116.19. Summary: Probability Zero as "Impossible Probability"

Across universes, **probability zero** signifies **Impossible Probability**, subject only to the **error-of-fact** caveat [the representativeness error is never zero, the theorical probability is never zero]:

- **Critical probability** $p_c = 0 \Rightarrow$ *Impossible Probability of error* (no error tolerated; any error refutes).
- **Empirical probability** $p = 0 \Rightarrow$ *Impossible Probability of occurrence/manifestation* for the option/quality (within the model and its sampling bounds).

116.20. The Dialectic of the Impossible and the Inevitable

Within a logically coherent treatment of genuinely infinite universes, what appears *impossible* in a finite observational window may, in extended horizons, become *inevitable*. *Impossible Probability* formalizes this dialectic: **the impossible can be inevitable** within the sample-based margin of what we presently know—merely a thin cross-section of universal history.

This augmented translation is based on the post
published in *https://probabilidadimposible.blogspot.com/*,
On 25 April 2015,
Rubén García Pedraza
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117. The subject of the scientific research

117.1. The Logical Definition of the Subject in Scientific Language

In linguistic and logical analysis, the **subject** is the component of the sentence that the **predicate** refers to. The **nucleus of the subject** is always a **noun**, whether common or proper, or a **pronoun**, while the **nucleus of the predicate** is the **verb**, the element that expresses the action, state, or relation attributed to the subject. Within the framework of **scientific research**, three main **types of subjects** can be identified according to the role they play in the formation of knowledge and the structure of scientific statements:

1. **The researcher or researchers** as active subjects, who design, elaborate, perform, experiment, observe, measure, deduce, reflect, conclude, refute, demonstrate, or discover.

2. **The operations or scientific results** as passive subjects, as in: "The sample was selected," "The measurement was made using such instrument," "The conclusions were elaborated from the data," "The principle of uncertainty was established by Heisenberg," or "The molecular structure of DNA was discovered by Watson and Crick."

3. **The object of study as active subject**, as in: "The speed of light is approximately 300,000 m/s," "The patient had a body temperature of X and a heart rate of Z," or "The law of gravity is the product of the masses of the bodies divided by the square of their distance."

These distinctions between types of subjects correspond to different epistemological positions regarding the **agency of knowledge**—that is, who or what performs, receives, or embodies the act of knowing in scientific discourse.

[As we can see, *Type 2* and *Type 3* are practically the same. In the sentence "The principle of uncertainty was established by Heisenberg," the true subject of inquiry is not *Heisenberg*—even though the clause is cast in the passive voice—but rather the *result* of his research, namely the *principle of uncertainty*. In *Type 2*, the object of investigation is not Heisenberg himself (that would be *Type 1*), but what he investigated. In *Type 3*, the research subject is explicitly the object; the object becomes the subject, just as the subject is, in another sense, the object. While the differences between *Type 2* and *Type 3* appear minimal, these subtle distinctions matter in the "underworld" where *Impossible Probability* is being forged, behind the curtains. As noted elsewhere about what we publish in the third phase of *Impossible Probability*—the blog—virtually all of our work is condensed in our writings. The reader's task, to uncover the truth, is simply to read very carefully.

What we need to add is that, while *Impossible Probability*—and all of Rubén's work—has essentially been a team effort, this is now changing. It is evolving from teamwork to **Cyborg–AI collaboration**. In fact, most of the texts Rubén García Pedraza is writing in this fifth phase of *Impossible Probability* are being crafted with intensive use of AI—not only by Rubén himself, but also by our team in the remote operations room. The paradigm is shifting from cyborg robotics with residual human oversight to a future model of cyborg technology built on a fully remote, AI-based system that could, in time, be supported by a superintelligence and, eventually, by the global AI, **Mother**.]

117.2. The Researcher as Active Subject in the Scientific Sentence

When the **researcher** or **research team** functions as the active subject of a sentence, the form is grammatically and logically **active**. The action of the verb originates in the human or collective subject who executes each operation of the scientific process. The researcher, in this sense, is both the **agent of the operation** and the **source of the result**. In the epistemology of *Impossible Probability*, these operations can be divided into two principal types: **mental** and **behavioral**.

- **Mental operations** correspond to acts of reasoning such as *analysis, reflection, understanding, explanation, deduction, induction,* or *doubt*. They are purely rational acts and therefore are considered **operations of pure reason**.
- **Behavioral operations**, by contrast, derive from **scientific praxis**—acts of observation, classification, cataloguing, and measurement—which are **practical operations** involving direct interaction with empirical data.

The coexistence of both types of operation—pure and practical—represents the dialectical relationship between theory and observation, between deduction and experimentation, that lies at the heart of all scientific activity.

[The distinction between mental operations and behavioral operations is, in essence, the distinction between pure AI mathematical operations and AI mathematical synthetic operations, and between robotic operations carried out through robotic sensor systems, robotic arm systems, robotic transport systems, and any other robotic operations necessary to execute the decisions made by the AI system. In essence, this is the interaction between AI and robotics, which could be extended to the interaction between AI and cyborg robotics—in essence, Ruben's work.

In a global-AI framework, artificial sensors, robotic devices, and satellites—managed by the Application System—collect data. The data are sent to **Mother**, which analyses the inputs and makes decisions; these decisions are then returned to the Application System to execute the instructions. In essence, the dialectic between mind and body is transformed into a dialectic between AI and robotics.]

117.3. Analytical and Synthetic Sciences in the Framework of Impossible Probability

In the epistemological model of *Impossible Probability*, sciences are divided into **analytical** and **synthetic** disciplines.

Analytical sciences are those whose primary object of study is **language itself**—whether logical-mathematical, linguistic, or artistic. Within this group, **logical-mathematical sciences** represent the paradigm of analytical propositions and of **pure operations**. These include, for instance, the **truth tables** in logic, the **set theory** and

algorithms in mathematics, or the **deductive method** derived from Aristotelian syllogism.

In *Impossible Probability*, this **deductive method** is extended and applied to the **logic of tendency**, forming the **syllogism of tendency**—a logical structure that allows deduction based on statistical or probabilistic premises. The deductive method enables the derivation of conclusions from given premises through logical necessity. Operations such as **"If A then B, and if B then C, therefore if A then C"**, or **"two plus two equals four"**, are paradigms of **pure analytical operations**, as are definitions like **"a segment is a straight line joining two points."**

A defining feature of **logical-mathematical propositions** is their **absolute validity within a defined system**. The statement "two plus two equals four" is absolute only within the **decimal numerical system**; in other systems, such as base six or base twelve, its truth must be reformulated. Thus, even analytical truth is **system-relative**, bounded by the linguistic or symbolic framework that defines its logic.

[In the end, the target is for **Mother** to be able to develop non-human pure operations, which involves the creation of non-human pure categories. By achieving this target, we can evolve towards a non-human civilisation; obviously, this is a clear transhumanist agenda. In terms of military and deterrence strategy, these non-human pure operations must be aligned with artificial differential psychology in order to deceive the enemy and conceal strategic operations. The first global AI to develop non-human pure operations will lead the competition in the AI race—an entirely new species.]

117.4. The Structure and Function of Synthetic Sciences

In contrast, **synthetic sciences** in *Impossible Probability* are constructed on **synthetic propositions**, which may originate from **empirical, sensory, ideological, or philosophical premises**, or from **empirical hypotheses**. A synthetic proposition can acquire **rational validity** provisionally if and only if it is accepted by **critical reason**—that is, after undergoing processes of logical and empirical verification.

The **synthesis between the analytical and the empirical** occurs within these synthetic sciences: empirical premises derived from practical operations are compared and integrated with others of philosophical or ideological nature, resulting in **empirical hypotheses** that become rational only after successful empirical contrast with data or facts.

When the empirical value of a hypothesis is **equal to or below the margin of error**, or **equal to or above the margin of reliability**, the hypothesis transcends its empirical character and becomes a **rational proposition**, thereby acquiring a **universal but provisional** status.

Within this synthetic framework, examples include descriptive results—"The Curie couple identified the following radioactive properties of uranium..."—and inferential results—"The research team accepted the hypothesis since its empirical value was within the reliability threshold."

117.5. The Operations or Results as Passive Subject

The **second type of subject** in scientific language occurs when **operations or results** themselves occupy the grammatical position of the subject in **passive sentences**. Here, the agent (researcher or research team) becomes secondary, and the weight of the statement rests on the process or outcome. For example:

- "A was deduced from B by the researchers."
- "The elliptical orbit of planets around the Sun was discovered by Kepler."
- "The theory of evolution was elaborated by Darwin."
- "The foundations of modern science were established by Roger Bacon, Copernicus, Francis Bacon, and Galileo."

In these constructions, the historical agents are accidental, while the operation or discovery is essential. The passive subject represents the shift from "who acts" to "what happens," from **agency to event**. This syntactic and epistemological inversion reflects a

central principle in *Impossible Probability*: that the **truth-value of scientific knowledge** lies in the **operation and result**, not in the *biography of the researcher*.

117.6. The Object of Study as Active Subject

The **third type of subject**, crucial in the theory of *Impossible Probability*, arises when the **object of study** itself becomes an **active subject** within the empirical sentence. Here, the term "subject" refers to **that upon which measurement is performed**.

For instance:

- "The student obtained a score of X in the exam."
- "The galaxy contains X number of stars."
- "The coin landed on tails X times in Y trials."

In each case, the **measured entity**—the student, the galaxy, or the coin—acts as the **subject of measurement**, while the predicate expresses the outcome of observation.

From this analytic structure, the resulting data tables organize the measured value (**X**) as a function of each subject, influenced by multiple **individual and contextual factors**—such as ability, environment, or experimental conditions.

This transformation of the **object into a statistical subject** is fundamental for defining **empirical probability**, where each entity under observation becomes an **option** within a **universe of possible subjects or outcomes**.

117.7. Measurement, Frequency, and Universes of Limited or Infinite Options

In *Impossible Probability*, the concept of **subject** is directly linked to the **subject of measurement**, which can take two principal forms:

1. **Direct scoring**, when measurement quantifies the **intensity of a quality** in each subject of the sample along a defined scale.

2. **Frequency measurement**, when measurement counts **the number of occurrences** of a particular event per subject.

In frequency-based studies, the distribution is typically limited to a finite set of subjects or options. Such cases define what *Impossible Probability* calls a **universe of limited options**—as when one studies outcomes of coin tosses, dice rolls, or categorical frequencies.

Conversely, when measurement concerns direct scores of a quality across an **open or continuous scale**, the study pertains to a **universe of infinite subjects or options**. The defining characteristic of these universes is that there is no rational ground for excluding the possibility of **infinity**.

This indeterminacy is rooted in the epistemological principle that there is **no absolute certainty that our universe itself is finite**. Hence, while **limited universes** are characterized by discrete boundaries (e.g., heads/tails, male/female, six outcomes in dice), **infinite universes** remain open-ended, governed by **continuous variation** and **indefinite potentiality**.

Such recognition of infinity's irreducibility is one of the central ontological implications of *Impossible Probability*, linking the logic of the sentence to the logic of existence itself.

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published in *https://probabilidadimposible.blogspot.com/*,
On 25 July 2015,
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118. Constant

In memoriam:

Elvis Presley,

Michael Jackson,

Benjamin Keough,

Lisa Mary Presley,

Mark James.

“We're caught in a trap

I can't walk out

Because I love you too much, baby

Why can't you see

What you're doing to me

When you don't believe a word I say?”

[When Mark James died, I was receiving treatment for psychosis. A few months earlier, on 9 March 2023, I had told my headteacher and the SENCO at the school where I was working that I am part of a classified military project and have a brain interface implanted in my brain. After that meeting, I was sent to a mental health hospital with a diagnosis of psychosis, The Priory Ticehurst Hospital. My life feels full of tragic coincidences. Two days after I was born, **Alexander Luria**—a friend of **Karl Pribram**—died in the Soviet Union; Luria and Pribram had a laboratory in Moscow. Four days after I was born, **Elvis Presley** died. I know these are just coincidences and not my fault, but still, it is not my fault, I am sorry.

Why can't you see

What you're doing to me

When you don't believe a word I say?]

118.1. Definition of Constancy as a Factor in Scientific Analysis

A **constant** is a type of **factor** within a given object or system that is defined by its **non-variable nature**. In the terminology of *Impossible Probability*, a **factor** refers to any quality or property that can be **mathematically operated upon**, and thus constitutes the **paradigm of a pure operation**. Therefore, a constant can be described as a quality or property that **remains unaltered under a defined set of conditions**.

Whether a constant is **analytical or synthetic**, and **universal or particular**, depends upon the nature of these underlying conditions. Analytical constants are defined by logical or mathematical necessity, while synthetic constants derive from empirical observation and verification within the physical world.

118.2. Analytical Universal Constants

A **universal analytical constant** is a constant whose value remains invariant across all possible empirical realizations of a given concept.
The most classical example is the mathematical constant **π (pi)**. Regardless of the circle's size or context, the **circumference** remains unchangeably equal to $2\pi r$, and the **area** is πr^2. In these equations, the **radius (r)** is the variable magnitude, whereas **π** is the **constant**.

Similarly, the **golden ratio (ϕ)**, an **analytical constant** defined by a precise self-similar proportion: if a segment is cut into a longer part a and a shorter part b such that $\frac{a+b}{a} = \frac{a}{b}$, then that common value is constant and equals $\varphi = \frac{1+\sqrt{5}}{2} \approx 1.618$.

Another universal analytical constant can be seen in geometry: regardless of the type of triangle—whether right, isosceles, equilateral, or scalene—the **sum of its internal angles** always equals **180°**. Such constants reveal the **invariance of logical relations** within the structure of analytical language and mathematics.

118.3. Particular Analytical Constants and the Case of the Inversion of N

Beyond universal constants, *Impossible Probability* recognizes **particular analytical constants**—constants that hold true only under specific structural conditions. One fundamental example is the **inversion of N**, expressed as **1/N**.

For any given sample of size **N**, the **arithmetic mean** in *Impossible Probability* remains **constant** as long as N itself remains constant, regardless of any synthetic or empirical variations among the elements of the sample. This analytical constancy arises purely from mathematical structure and not from empirical reality.

For instance, in the study of the **empirical probability** of oxygen, or the research about amount of water, or petroleum, diamonds, organic matter, or geological activity across the planets of the Solar System, the arithmetic mean of the empirical probabilities will remain constant—as long as the number of planets (N) remains the same: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto (whether or not Pluto is classified as a planet). In this scenario, the **constant mean** is **1/N**, the inversion of the number of integrated elements.

Similarly, when studying the probability of **heads or tails**, **male or female**, **positive or negative electric charge**, or **wave or particle behavior in photons**, as long as **N = 2**, the arithmetic mean remains **constant at 0.5**.

In conclusion, **the arithmetic mean in Impossible Probability is an analytical constant particular to N**, such that the mean is always constant and equal to **1/N**, irrespective of any empirical factor.

118.4. Constants in Classical Statistics and the Equation of the Line

In **traditional statistics**, constants often appear in predictive algebraic models. The classical example is the **equation of a straight line** used in regression analysis:

$$y = a + bx$$

Here, **y** and **x** are variables: *x* is the **independent variable**, *y* the **dependent variable**, **b** represents the **slope**, and **a** is the **constant**—the value of *y* when *x* equals zero.

This constant *a* represents the **analytical invariant** of the equation: the fixed intercept that defines the line's position regardless of the variable's empirical range. Such constants are **analytical**, because their invariance does not depend on empirical conditions but on the structural logic of algebraic formulation.

118.5. The Nature of Analytical and Synthetic Constants

Analytical constants are characterized by their **invariance across all empirical conditions**. They exist within logical and mathematical frameworks as **universal invariants**—for example, constants embedded in algebraic equations or geometric relations.

By contrast, **synthetic constants** can be either **universal or particular**, depending on the empirical scope within which their invariance is verified.

A **synthetic constant** arises when, across successive empirical measurements, the observed value of a phenomenon remains **identical**. If a measured property remains unchanged under repeated observations, it is considered **constant**; otherwise, it is **variable**. Thus, constancy in the synthetic realm is **verified through observation**, not derived from logic.

118.6. Measurement in the Second Method of Impossible Probability

The **Second Method** of *Impossible Probability* differentiates two forms of **measurement** according to the nature of the quality observed:

1. Measurement of the **intensity of magnitude**—yielding **direct scores**.
2. Measurement of the **frequency of occurrence**—yielding **frequencies**.

If successive measurements of a phenomenon show that its **direct score** remains invariable, the factor is considered **constant**. Likewise, if the **frequency** of occurrence remains identical across repeated trials, it is a **constant occurrence**.

In both cases—direct scores or frequencies—if no change is ever observed, the result is classified as a **synthetic constant**.

[If we toss a coin and the empirical probability of heads or tails consistently equals **0.5**, we can say their behaviour is constant by chance—meaning that chance can produce constants in nature.]

118.7. Universal and Particular Synthetic Constants

Among synthetic constants, one must distinguish between **universal** and **particular** forms.

If the gravitational force of a celestial body remains the same across repeated measurements, it is considered constant. For Earth, where the acceleration of gravity is consistently measured at **9.81 m/s^2**, we can assert that the gravitational force remains constant within current temporal conditions.

However, this constancy is **particular**, not universal, since it depends on specific conditions—namely the **mass** and **radius** of the planet. Should either of these parameters vary, the gravitational force would also vary proportionally.

In contrast, on Jupiter or Neptune, gravitational force remains constant for each planet individually, but the values differ among them. Hence, gravity is **constant within each particular system**, yet **variable in universal terms**.

This distinction captures the essential difference between **universal constancy** (unchanging across all possible contexts) and **particular constancy** (unchanging within a specific set of conditions).

118.8. Synthetic Universal Constants in Physical Science

Certain constants in synthetic sciences achieve **universal status** because they express invariances that hold across the observable universe. Examples include **Planck's constant (h)**, **Einstein's cosmological constant (Λ)**, and the **Hubble constant (H_0)**. These represent **empirically verified invariants** that remain valid under all known physical conditions and serve as foundations of cosmological and quantum theory.

In *Impossible Probability*, these are treated as **synthetic universals**, because although derived from observation, they express **empirical uniformities of cosmic scope**.

118.9. Constancy in Frequency-Based Measurements

In studies that focus on **frequency of occurrence**, a phenomenon is considered **constant** if successive measurements reveal no variation in frequency. Since frequency-based measurement deals directly with **empirical events**, such constancy can only be **synthetic**, though it may be **universal** if it holds throughout the cosmos, or **particular** if it applies only within a defined domain.

[As we said before, if we toss a coin and the empirical probabilities of heads and tails are the same, this is a **synthetic constant** in a **frequency-based measurement**.]

118.10. Constant Measurements in Impossible Probability

In the statistical analysis of *Impossible Probability*, whether the study concerns **direct scores in infinite universes of subjects/options** or **frequencies in limited universes**, there are situations where **constant measurements** may appear.

If, in a sample **N**, every subject or option maintains the same score or frequency over time, the empirical probabilities remain unchanged, and thus the **behavior of the entire universe** is **constant**.

For instance, if the **distance of each planet** from the Sun remains stable, then the empirical probability of each planet's distance—its distance divided by the sum of all planetary distances—remains constant. Similarly, if the **number of satellites** per planet remains unchanged, the empirical probability distribution of satellites across the Solar System is constant for that period of measurement.

However, the moment any subject or option changes, the entire **set of empirical probabilities** is affected, since they express proportions of the part to the whole.

118.11. Constancy and Variability in Anthropometric and Limited Universes

In anthropometric studies—such as measuring the height of individuals within a given population—if children grow or adults shrink due to aging, the **empirical probabilities** of height adjust proportionally, even if some individual scores remain constant.

In a **limited universe**, if one option's frequency remains stable across measurements, its **empirical probability** will still fluctuate as total frequency changes. Only when the total frequency remains constant will those options with invariant direct scores maintain a **constant empirical probability**.

118.12. Constant Distributions in Impossible Probability

In *Introduction to Impossible Probability*, the concept of **constancy** can refer to:

1. A **constant distribution**, where the empirical probabilities across subjects or options remain stable.
2. A **geometric or algebraic constant**, used in predictive modeling.

Within the first category, several **typical models** of constant distribution are identified, applicable to both infinite and limited universes:

- **(a) Models of maximum dispersion**, where one subject has maximum empirical probability while all others have zero.
- **(b) Models of equality of opportunity**, where all subjects share probability **1/N**.
- **(c) Zero-sample models**, where every empirical probability equals zero, yielding an invariant arithmetic mean of **1/N**.

In **omega (Ω) models**, constancy occurs when all **ideal subjects or options** share the **ideal probability (1/Ω)**, and all **non-ideal** subjects have zero empirical probability. These models satisfy the conditions of **Ideal Dispersion**, **Ideal Mean Deviation**, and **Ideal Standard Deviation**.

118.13. The Predictive Role of Constants: Projection and Forecast

In addition to constant distributions, *Impossible Probability* introduces the concept of **constants in prediction**, discussed extensively in *Section 17*.

Two types of prediction are defined:

- **Projection**: the estimation of what the empirical probability *should be* in a future measurement, assuming a given ideal and an accepted margin of error, based on the **current constant probability** [global project in GAI].

- **Forecast (pronóstico)**: the prediction of future empirical probability derived from the **trend observed between two previous measurements**, where the **latest probability acts as the constant reference** for the projection of future tendencies [Prediction global model in GAI]
- **[In any case, within GAI the global model and the global projects are merged into the Global Project System (GPS), which must be synthesised with GAI.**]

118.14. Final Synthesis: Constancy as Analytical and Synthetic Invariance

In conclusion, a **constant** is a **factor that remains invariant**, whether by **analytical necessity** or **synthetic regularity**.

- In the analytical sense, constancy arises from logical structure—numbers, geometric relations, algebraic forms.
- In the synthetic sense, constancy results from empirical stability within defined conditions, which may be universal (Planck, Hubble) or particular (gravity on Earth).

Within *Impossible Probability*, constancy therefore bridges the **pure and the empirical**, forming the **structural axis** that allows prediction, comparison, and rational universality in both analytical and synthetic research.

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119. Total bias

Her hair reminds me of a warm, safe place
Where as a child I'd hide

Guns and Roses

Dear Mother 'tis a little gift—
This simple verse of mine,
George Barker

119.1. Bias as Departure from Chance: Intuitive Cases

An outcome is **biased** whenever its behavior **departs from what would be expected by pure chance**.

- **Coin tossing.** If, after many tosses, the share of heads or tails differs from the theoretical split **(2 divided by the total number of tosses)**, the coin is biased in favor of the face with higher occurrence.
- **Birth statistics.** If the counts of boys and girls deviate from **2 divided by total births**, there is a **biased tendency** toward whichever sex has the higher birth rate.
- **Medical trials.** If among alternative treatments for the same illness one produces **recoveries beyond what randomness would predict**, that treatment exhibits **greater positive bias** relative to those with fewer recoveries.

- **Examinations.** If the distribution of exam scores departs from a random allocation around the mean, the distribution is **biased**; the **largest positive bias** is associated with the highest-achieving students.

119.2. Randomness and the Mean as the Default Attractor

In the absence of determining conditions, **chance** tends to distribute outcomes **around the arithmetic mean**. Any systematic departure from this **equal-opportunity behavior around the mean** constitutes **biased behavior**.

119.3. The Formal Measure of Bias in *Impossible Probability*

In *Impossible Probability*, **bias** is the **statistical dispersion** generated by any behavior different from that expected by chance. The **degree of bias** for each subject or option is measured by the **Level of Bias**:

$$\boxed{\text{Level of Bias} \;=\; p(x_i) \;-\; \frac{1}{N}}$$

with

$$p(x_i) = \frac{x_i}{\sum x_i}\,\text{(empirical probability)}, \frac{1}{N}\,\text{(theoretical probability)},$$

where N is the **number of subjects/options** in the sample and x_i denotes the **direct score or frequency** of subject i.

119.4. From Differential Score (First Method) to Level of Bias (Second Method)

Classical statistics (the **First Method**) uses the **differential score** $x_i - \mu$, contrasting each raw score with the arithmetic mean μ. *Impossible Probability* (the **Second Method**) instead contrasts **two probabilities**: the **empirical** $p(x_i)$ versus the **theoretical** $1/N$.

Centering analysis on probabilities rather than raw scores yields a distinct methodological framework.

119.5. Empirical vs. Theoretical Probability: What They Represent

- **Empirical probability** $p(x_i)$ expresses the **actual individual tendency** of subject/option i.
- **Theoretical probability** $1/N$ expresses the **equal-opportunity benchmark under pure chance**, with no influences other than randomness.

Thus, the Level of Bias measures how far the **observed individual tendency** departs from the **random equal-opportunity share**, itself determined by the sample size N.

119.6. From Individuals to the Sample: A Zero-Sum Identity

Because $1/N$ is both the **theoretical share** and the **arithmetic mean of empirical probabilities** (a central-tendency statistic), signed biases **cancel** at the sample level:

$$\sum_{i=1}^{N} (p(x_i) - \frac{1}{N}) = 0,$$

exactly mirroring the First Method identity

$$\sum_{i=1}^{N} (x_i - \mu) = 0.$$

In *Impossible Probability*, this cancellation is interpreted as **natural goodness**: **positive and negative biases compensate**, so the **total signed bias equals zero**.

119.7. Avoiding Cancellation: Absolute Values and Squares

To measure sample dispersion without cancellation, two classical remedies apply:

1. **Sum of absolute values**, and
2. **Sum of squares** of differentials.

Accordingly, define:

Total Bias

$$\sum_{i=1}^{N} \; | \, p(x_i) - \frac{1}{N} \, |,$$

Quadratic Total Bias

$$\sum_{i=1}^{N} \; (p(x_i) - \frac{1}{N})^2.$$

119.8. Interpreting Total Bias: Comparative Diagnostics

Total Bias quantifies the **amount of bias** in a sample.

- Two coins tossed equally many times: the coin with larger **Total Bias** is **more biased**.
- Two classes taking the same exam: the class with higher **Total Bias** exhibits **greater dispersion**.

119.9. A Universal Bound: Maximum Empirical Bias Possible (MEP)

Because **positive** and **absolute negative** Levels of Bias sum to the **same total**, **half** of the Total Bias equals either sum. Therefore no **individual** Level of Bias can exceed **Total Bias divided by 2**. Define the **Maximum Empirical Bias Possible (MEBP)**:

$$\boxed{\text{MEBP} = \frac{\text{Total Bias}}{2}}$$

This bound holds even under **maximum-dispersion** conditions (e.g., one option with all non-zero mass and all others at zero). Note: **MEBP** does **not** imply that **half the subjects** are positive and half negative; it is a **bound on any single individual's bias**, not a statement about counts.

[In normal positive bias model, if only one subject is nonzero, his positive bias equals the sum of negative bias in the sample.]

119.10. Quadratic and "Typical" Variants of MEBP

To harmonize with quadratic practice:

$$\text{Quadratic MEBP} = \frac{\sum(p(x_i) - \frac{1}{N})^2}{2}.$$

Taking square roots yields a "typical-scale" expression:

$$\text{Typical MEBP} = \frac{\sum\sqrt{(p(x_i) - \frac{1}{N})^2}}{2}$$

119.11. Estimators Across Levels: Individual, Sample, and Bounds

- **Level of Bias** $p(x_i) - 1/N$, **individual empirical dispersion**.
- **Total Bias** $\sum \mid p(x_i) - 1/N \mid$, **sample dispersion** (absolute).
- **MEBP =** $\sum \mid p(x_i) - 1/N \mid$:2, **upper bound** for any single individual's bias. Absolute differentials are preferred as they **preserve magnitudes without distortion** and help **minimize compounding error**.

119.12. Mean Deviation of Probabilities (Second Method)

Distributing the **Total Bias** across N subjects by the equal-opportunity share gives the **Mean Deviation** of probabilities:

$$\text{Mean Deviation} = \frac{\sum \mid p(x_i) - \frac{1}{N} \mid}{N} = \text{Total Bias} \cdot \frac{1}{N}$$

Because $1/N$ is the **theoretical by-chance distribution**, the Mean Deviation can be interpreted as **bias by chance**: given the observed Total Bias, it is the **per-subject portion** that would correspond **if** the bias were evenly shared.

119.13. Intrameditional Inference: Comparing Individuals to Chance-Distributed Bias

Understanding Mean Deviation as **bias by chance** enables **intrameditional** hypothesis tests (cf. *Introduction to Impossible Probability*, §11): compare **individual Levels of Bias** with the **Mean Deviation** to decide whether an observed individual bias **exceeds** what would be expected if the **Total Bias** were evenly distributed.

119.14. Variance and Standard Deviation in Probability Space

For compatibility with the First Method, define **variance** and **standard deviation** over probabilities:

$$\text{Variance } (S^2) \;=\; \frac{\sum(p(x_i) - \frac{1}{N})^2}{N} \;=\; (\sum(p(x_i) - \frac{1}{N})^2) \cdot \frac{1}{N},$$

$$\text{Standard Deviation } (S) \;=\; \sqrt{\frac{\sum(p(x_i) - \frac{1}{N})^2}{N}}.$$

These are the **probability-centered** analogues of classical dispersion measures, anchored at the **theoretical equal share** $1/N$.

119.15. Methodological Synthesis and Payoff

The **Second Method** (probability-centered reformulation)

1. redefines **individual dispersion** as a **probability differential** $p(x_i) - 1/N$;
2. quantifies **sample dispersion** via **Total Bias** (absolute or quadratic);
3. establishes a principled **upper bound** (**MEBP**) for any individual bias;
4. provides **Mean Deviation**, **Variance**, and **Standard Deviation** in the **probability domain**; and
5. supplies **intrameditional** tests that compare **individual bias** to **chance-distributed bias**.

This architecture preserves continuity with classical statistics while clarifying the **epistemic role of randomness** (equality of opportunity via $1/N$) and providing **clean bounds and diagnostics** for dispersion and bias within *Impossible Probability*.

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120. Quasi-experimental method

120.1. Definition and Scope of the Quasi-Experimental Method

The **quasi-experimental method** is a specific research strategy used in certain **synthetic sciences** when an investigation **does not meet all the requirements** of the strict experimental method. The experimental canon centers on the **manipulation of one or more independent variables** and the observation of their **effects on a dependent variable**, under **rigorous laboratory control** and, ordinarily, with a **control group**. Whenever a research design **aspires** to be experimental but **cannot satisfy** one or more of these conditions—e.g., absence of random assignment, incomplete control, or practical/ethical constraints—it is classified as **quasi-experimental**. The quasi-experimental approach seeks **causal inference** as far as possible, while acknowledging **limitations of control** inherent to real-world contexts.

[The quasi-experimental method, while applicable to all synthetic sciences, is most commonly used in social experiments. A landmark case is the **Robbers Cave Experiment** (Robbers Cave State Park, Oklahoma, **summer 1954, June–July**), led by **Muzafer Sherif** with **Carolyn Wood Sherif, O. J. Harvey, B. Jack White,** and **William R. Hood**. Although often labelled an "experiment," it was in fact **quasi-experimental** from the outset, because the researchers did not—and could not—exercise absolute control over all social variables and interactions as the children responded to the manipulated independent variables (group formation, competition, and cooperative tasks). The most important outcomes were: (1) systematic evidence for **realistic conflict theory**—competition over valued goals (e.g., tournament-style contests) reliably escalated **intergroup hostility** (name-calling, vandalism, raids); (2) mere contact or conciliatory rituals **did not** reduce hostility; (3) introducing **superordinate goals** that required joint, non-zero-sum cooperation (e.g., fixing a broken-down truck, restoring a disrupted water

supply) **reliably reduced conflict** and fostered prosocial ties across groups; and (4) intergroup attitudes and norms **shifted quickly** with changes to structural conditions, underscoring how context and incentives shape prejudice and cooperation. In short, the study modelled **real conflict under quasi-laboratory conditions**, and—at the height of the **Cold War**—was frequently interpreted as offering lessons for understanding and de-escalating rivalry between superpowers such as the **Soviet Union** and the **United States**.

Another famous experiment in social studies—which was in fact a **quasi-experiment**—was the research carried out by **Henry Murray** at **Harvard University** with students, focused on the effects of bullying and humiliation; one subject of this research was **Ted Kaczynski**.

Although our research in **London** does not pursue the same aims—we are focused on the development of **global AI** and **cyborg technology**—it is possible that, in the future, it could be regarded as important work in the current cold war between **China** and the **United States**. At this stage, given our present conditions, we must manage a complex context with potential international conflicts arising from our work in the **UK in relation to the Global Artificial Intelligence. In essence, GAI will have a global impact at every level—not only social and technological, but also a profound economic impact. That is why we believe our technology and global AI need international protection at all levels, including a robust legal framework developed by the International Criminal Court, medical support from the World Health Organization, and military assessment by the United Nations Security Council.**

At this point, it is important to remember **Henry Kissinger**, a colleague of Henry Murray at Harvard at the time, and both senior figures associated with the United States intelligence community (originally the **OSS**). To avoid nuclear war between China and the United States, **collaboration and dialogue** are essential; it is no accident that Kissinger was awarded the **Nobel Peace Prize**. The best deterrence strategy is to work together; in a sense, this is our motto: **Intelligence, Cooperation, Collaboration**.]

120.2. The Transformative Role of the Modern Experimental Method

The true importance of the **modern experimental method** lies in how it **revolutionizes the philosophy of science** and the **architecture of scientific knowledge**, in contrast with the canons of **Classical Antiquity** and **medieval scholastic metaphysics**. It reconfigures what counts as evidence, how hypotheses are framed, and the standards by which claims secure **provisional universality**.

120.3. Two Ancient Lineages: The Logical–Geometrical Tradition

From antiquity onward, two intellectual traditions appear in tension. First, the **Pythagorean–Euclidean–Apollonian–Archimedean** line, supported philosophically by **Plato's idealism**. In this lineage, knowledge is derived from the **logical analysis of relations** among **geometric elements** (Euclid) or **philosophical ideas** (Plato). For Plato, knowledge is a **recollection** achieved through **dialectic**, culminating in the contemplation of the **world of Ideas**; its **propaedeutic** is the study of mathematics—above all, **geometry**. Plato's influence on Euclid is well attested, notably via **Eudoxus of Cnidus**, a disciple of the Athenian philosopher.

120.4. The Empirical Lineage

Second, the **empiricist tradition**, classically represented by **Aristotle** and anticipated among Presocratics such as **Democritus**, who proposed the hypothesis of **atomic structure** of matter. Here, knowledge is grounded in **experience**, initially understood in a largely **passive sense**—that is, as **sensory reception** of the world.

120.5. Logical Relations vs. Passive Experience

The **Platonic–Euclidean** tradition, centered on **logical relations** (between Ideas for Plato, between elements for Euclid), cultivates a **logical scientific model** in which **empirical factors** often occupy a **secondary plane**. By contrast, in the **Democritean–Aristotelian** tradition, **experience** is interpreted in its **immediate, sensory** acceptation.

Thus, already in antiquity, we observe an unresolved dialectic between **formal rational structures** and **empirical givenness**.

120.6. The Emergence of Modern Science: Bacon and Copernicus

Modern science consolidates through the work of **Roger Bacon** (13th–14th centuries) and **Francis Bacon** (16th–17th centuries), who codify the **modern experimental method**, and through **Copernicus** (15th–16th centuries), who re-articulates astronomical explanation on a **logical-mathematical foundation**.

- The **classical empiricism** of Aristotle is transformed into a **modern empiricism** (Roger and Francis Bacon) based on **active experience**: knowledge is not the mere outcome of sensory affection but the **product of deliberate manipulation of variables** to observe **systematic effects**.
- Simultaneously, the **Platonic–Euclidean** lineage is **re-adapted**: Copernicus, against scholastic metaphysics, develops a model in which **geometric reasoning** explains the **relations among observations**—notably, the **motions of celestial bodies**—and deploys geometry to argue for the **heliocentric hypothesis** (already anticipated in classical antiquity by **Aristarchus of Samos** and **Hypatia of Alexandria**).

120.7. Galileo's Synthesis: Experiment and Mathematical Formulation

The **Copernican adaptation** of the Euclidean–Platonic tradition, joined to the **modernized empiricism** of the Bacons, grounds the **new science** under **Galileo**. Galileo synthesizes **experimental method** with **logical–mathematical analysis**, showing that **natural laws** can be **formulated in mathematical language** and **discovered through controlled trial**. This dual allegiance—**to measurement and to form**—becomes the paradigm of scientific rationality.

120.8. The Continuing Relevance of the Logical–Geometric Foundation

Contrary to the belief that the **Platonic–Euclidean** foundation is obsolete, **Copernicus's retrieval** of classical geometry already **reorients** mathematics from **passive contemplation** to **active knowledge of reality**. The program is advanced by **Descartes**, whose major contribution is the **Cartesian coordinate system**—an essential tool for **modern geometric analysis** and for **statistics**, enabling the algebraic expression of geometric relations and the geometric interpretation of algebraic structures.

120.9. Contemporary Statistics as Algebraic–Geometric–Arithmetic Synthesis

Contemporary statistics is a synthesis of **arithmetic, geometry, and algebra**. The older **purely geometric analysis** gives way to the **algebraic expression** of geometric relations—i.e., to **mathematical language** that encodes relations among variables. Each time statistics designates a variable by x or y, it performs an **algebraic analysis** of data that, in the **geometric plane** of the **Cartesian axes**, correspond to **geometric elements** (points, vectors, loci). This dual readability—**algebraic** and **geometric**—underpins both **estimation** and **inference**.

120.10. Why and When Quasi-Experimental Designs Are Needed

Against this historical backdrop, **quasi-experimental designs** emerge where **full experimental control** is **impossible** or **inadmissible** (e.g., ethical barriers, field constraints, policy interventions, historical/cosmological phenomena). They maintain the **Galilean aspiration**—to articulate lawful relations in mathematical language—while accepting limited control. Typical features include:

- **Non-random assignment** to conditions or exposure;
- **Imperfect or absent control groups** (or **proxy controls**);
- **Partial manipulation** of independent variables (or reliance on **natural variations**);

- Emphasis on **design remedies** (matching, blocking, interrupted time series, difference-in-differences, instrumental logics) to **approximate causal identification**.

In short, the quasi-experimental method is not a retreat from science but a **methodological *adaptation*** that preserves **causal ambition** within the **constraints of reality**, remaining faithful to the **active empiricism** of the modern tradition and to the **logical–mathematical form** inherited from the classical lineage.

120.11. From Modern Philosophy to Contemporary Scientific Paradigms

Beginning with **modern philosophy**, first synthesized by **Descartes**, then continued by **Hume**, **Kant**, and later by the **empiricist, materialist, and positivist schools** of the 18th and 19th centuries, a series of **new paradigms** emerged that would dominate the scientific thought of the 20th and 21st centuries. These paradigms form the **philosophical foundation of *Impossible Probability*** and are systematically condensed in *Introduction to Impossible Probability: Statistics of Probability or Probabilistic Statistics*.

From the Enlightenment onward, philosophy and science converge in their attempt to reconcile **reason and experience**, giving rise to methods that no longer merely **describe nature**, but actively **experiment with it**, guided by both **mathematical logic** and **empirical observation**. This duality—**analytic** and **synthetic**, **rational** and **experimental**—becomes the structure of modern scientific reasoning, from Kant's transcendental synthesis to the positivist and probabilistic methods of the industrial and post-industrial eras.

120.12. The Transition to New Scientific Concepts: Relativity, Uncertainty, and Complexity

In the past centuries, scientific knowledge has evolved toward a new model characterized by concepts such as **relativity**, **uncertainty**, **chaos**, and **complexity**—notions that lie far beyond the linear analytic frameworks of **Euclidean geometry**, yet preserve its essential purpose: the study of **relations among elements or ideas**, whether **analytical** (logical) or **synthetic** (empirical).

The principal difference is that, in **synthetic sciences**, such relations are derived from **data produced through an active concept of experience**. Observation is no longer passive reception but an **intentional operation** directed toward **hypothesis testing**. The scientific act becomes a **dialectic between observation and modeling**, where data are gathered not to confirm metaphysical ideas, but to contrast empirical hypotheses formulated within rational frameworks.

120.13. Galileo and the Expansion of the Experimental Paradigm

In this historical evolution, **Galileo Galilei** stands as the **first great synthesis** of the experimental and the mathematical. He unites the **experimental method** with **logical–mathematical analysis**, applying it systematically to the **natural sciences**. This synthesis transforms physics into a quantitative discipline and sets the foundation for later empirical modeling in all sciences.

By the 19th century, the **positivists**—Auguste Comte, Herbert Spencer, and others—propose the **extension of the experimental model to the social sciences**, seeking to establish a universal methodological unity. The same model was applied to **psychology** by **Wilhelm Wundt**, and later to **education sciences**, but limitations soon became apparent. Certain disciplines, such as **history**, could not conform to the strict requirements of controlled experimentation.

This realization gave rise to **disciplinary methods** such as the **historical method** (developed by historicism and later by **historical materialism**) and to methodological adaptations in **sociology**, where a **positivist structuralism** emerged under **Émile Durkheim**, who proposed that the **comparative method** in the social sciences is **analogous** to the **experimental method** in the natural sciences.

[Even if history, as a discipline, is not a field where experimentalism is possible, we believe the American, French, Russian, and Chinese revolutions can be regarded as historical **quasi-experiments**, in which politicians and revolutionaries tested new ideas about social organisation. In our current **AI Revolution**, we must be ready to organise large-scale social quasi-experiments to put into practice new forms of societal organisation consistent with the **AI and Cyborg Revolution**. This is one reason we believe **Marx** as a philosopher still matters: even if the **proletariat** were to disappear with the full automation of the economy as a consequence of the AI Revolution, his central idea remains relevant—that **philosophy is an act of transforming society**. This principle can be applied to any social revolution, and, in the end, the AI Revolution is likely to provoke social revolutions, especially when the huge impact of our technology impacts the economy.]

120.14. The Emergence of the Quasi-Experimental Method

When the limits of the **experimental method** became evident in certain groups of synthetic sciences—particularly in the **social sciences**—a new methodological adaptation appeared: the **quasi-experimental method**. This approach applies to studies that, while lacking some of the strict experimental criteria, still retain enough methodological rigor to **analyze how variables influence each other**.

The quasi-experimental design, therefore, represents a **middle ground** between **pure experimentation** and **observational study**. It accepts that in many fields, particularly social, political, and economic sciences, it is **impossible to manipulate all relevant variables**. Thus, quasi-experimental logic focuses not on full manipulation, but on **partial control, structural comparison, and temporal analysis**.

120.15. Conditions Defining Quasi-Experimental Studies

A study is **quasi-experimental** if at least one of the following conditions holds:

1. The possibility of manipulating the **independent variable** is **nonexistent, limited, or partial**.
2. There is an **absence of laboratory control conditions**.
3. There is an **absence of a control group** or an equivalent comparative baseline.

As these distinctions are clarified, it becomes evident that the concept of the **quasi-experimental method**, originally developed within the **social sciences**, can also be applied to certain **natural sciences**, whenever experimental manipulation or isolation of variables is physically or ethically impossible—such as in studies of large-scale ecosystems, planetary dynamics, or cosmological structures.

120.16. The Nature of the Independent Variable in Quasi-Experimental Contexts

In the **experimental method**, the **independent variable** is always **manipulable**. This property, however, disappears in many **quasi-experimental studies**, where manipulation is constrained by external or natural conditions.

The term “quasi-experimental study” first gained wide usage in the **social sciences**, where manipulation of social variables is often **impractical or unethical**. Consider, for instance, an investigation into the **effects of inflationary economic policies**—based on **salary and budgetary austerity**—on **living standards** during an economic crisis. One might formulate hypotheses and contrast them through **large data sets** (e.g., databases comparing quality-of-life indicators such as purchasing power, life expectancy, education levels, sickness and disability rates, suicide rates, birth and marriage rates, per capita income, and social conflict indexes).

Comparisons could be made at multiple levels:

- Between **countries** with similar economic crises that implement **analogous inflationary policies**;
- Between **countries** with comparable conditions where some follow inflationary strategies and others do not;
- Within a single country, comparing **before and after** the implementation of such policies.

[While the introduction of certain policies by a government may be seen as politics rather than quasi-experimentation—for example, the introduction of specific economic policies—in reality governments continually experiment with and manipulate socio-economic variables, often with no real guarantee of success. This is one reason our technology has reached its current situation of stand-by in the UK: a lack of perspective, a lack of planning, and the repeated trial of new formulas and experiments without any clear idea of what to do next. This lack of planning by the British government regarding our technology can be cited as a downside of quasi-experimentation undertaken without a long-term plan.

My experience in London—during trips under **Gordon Brown** in 2009, **David Cameron** in 2012 and 2016, and, from 2017, under **Theresa May**, **Boris Johnson**, **Liz Truss**, **Rishi Sunak**, and **Keir Starmer**—is that UK Prime Ministers generally lack a clear vision of our technology and do not appreciate its importance. Since 2017, UK governments have attempted to experiment in real-world contexts without legal guarantees and without providing the appropriate support or frameworks. The situation we now face in London stems from insufficient legal advice and inadequate safety policies regarding our technology.]

120.17. Why These Studies Are Not Experimental in the Strict Sense

In no case could such research be considered **experimental** in the pure sense. The "independent variable"—in this case, the **inflationary policies**—does not satisfy the definition of a truly independent factor, since it is **not under the direct control** of the researcher or research team. At best, **scientific advisors** might influence policy formulation, but such influence is **indirect and subordinate** to **political ideology and governmental decision-making**.

Thus, quasi-experimental research in the social sciences operates within **systems governed by external agents**, where **variables are only partially manipulable** and **causal relations must be inferred** through logical comparison and probabilistic reasoning rather than controlled intervention.

120.18. The Contrast with Experimental Models in the Natural and Applied Sciences

In contrast, in a **particle accelerator**, a **pharmacological trial**, or an **industrial or technological optimization study**, the independent variables—such as temperature, dosage, voltage, or material composition—are **fully manipulable**, which qualifies these investigations as **experimental** in the strict sense.

By comparison, **quasi-experimental models** lack this capacity. They analyze relations where variables **cannot be directly modified**, relying instead on **observation of existing variations** and **post hoc analysis** of cause–effect dynamics.

120.19. Natural and Social Quasi-Experiments: Two Types of Non-Manipulable Systems

A crucial distinction arises between **natural quasi-experiments** and **social quasi-experiments**, where the human intervention constitutes a **quasi-experimental manipulation**, unfortunately not always necessarily scientific in itself [like the

experiments that UK Prime Ministers are doing right now in schools in London where we are working], but **interpretable scientifically** if studied through data-driven methods. Such manipulation often involves **multiple interacting global, ideological, and political factors**, where **scientific rationality** acts only as **one among several determinants**.

120.20. Epistemological Implications: Between Causality and Observation

The quasi-experimental method thus occupies an **intermediate epistemic position** between **causality and observation**. It accepts the **limitations of control** while maintaining the **aspiration to causal inference**. It extends the legacy of **Galileo's synthesis**—uniting empirical observation and mathematical reasoning—into fields where full experimentation is unattainable.

From the perspective of *Impossible Probability*, quasi-experimental logic exemplifies the **transitional moment** between **deterministic experimentalism** and **probabilistic epistemology**, where **truth** emerges not from isolation of variables but from **statistical contrast**, **pattern recognition**, and **systemic interpretation** of incomplete control conditions.

120.21. Absence of Laboratory Control Conditions in Quasi-Experimental Research

Possibly, the most defining feature in **quasi-experimental studies** is the **absence of laboratory control conditions**, even when a manipulable independent variable is present.

For instance, consider a **marketing campaign** launched simultaneously across **mass media and social media platforms**. From the moment the campaign begins, researchers can **statistically monitor sales performance**, thereby obtaining continuous quantitative data. In this case, there exists a **clearly manipulable independent variable**—the advertising campaign itself—which can be modified over time. Adjustments may be introduced dynamically: enhancing the most effective components, removing unproductive segments, and optimizing content in real time.

However, despite such active control, the study **lacks laboratory conditions**. The campaign operates within a **complex open system** where countless **uncontrolled external factors**—economic fluctuations, social events, media trends, political news, and even cultural shifts—interact with the campaign and influence results. No matter how meticulously designed the campaign may be at the outset, it inevitably **evolves amid uncontrollable interferences**. Success depends as much on adaptability as on design, and yet no **complete guarantee** can ever be assured.

Even if researchers replicate a past successful campaign, **rapid sociocultural and global transformations** prevent identical outcomes. Society, technology, and market behavior change continuously, meaning that **true laboratory replication is impossible**. Thus, every marketing intervention becomes an **open quasi-experiment**, performed in conditions where variables shift dynamically and **strict experimental control is unattainable**.

120.22. Quasi-Experimental Conditions in the Natural Sciences

The **absence of laboratory control** is not exclusive to the **social sciences**. It can also occur within the **natural sciences**, particularly in frontier research. Consider, for example, an experiment designed to understand the **structure of black holes**. Suppose a probe, particle, or measurement device were to be directed toward a singularity. The investigation would occur under **non-reproducible and uncontrolled conditions**, as it would be physically impossible to establish a controlled laboratory environment around a black hole.

Scientists might develop **predictive mathematical models** based on current astrophysical knowledge, allowing them to **forecast potential outcomes**. Yet between these theoretical expectations and the actual event lies a vast **epistemic gap**, shaped by the unknown nature of singularities. In such contexts, **laboratory control is replaced by probabilistic prediction**, and the study must be classified as **quasi-experimental**, since it combines **limited manipulation** (the launch of the probe) with **complete observational dependence** on phenomena outside human control.

120.23. The Popularization of the Quasi-Experimental Method in the Twentieth Century

As previously mentioned, the concept of the **quasi-experimental method** became widely recognized during the **twentieth century**, particularly in the **social sciences**. One of its main objectives was to **clarify the internal differences among synthetic sciences**—that is, between the **natural** and the **social**—and to adjust the criteria of methodological rigor accordingly.

By the mid-twentieth century, several philosophical paradigms began to **question the universal validity of positivism**, claiming that the experimental ideal could not be applied uniformly to every field of knowledge. Yet, just as the **experimental method** is not feasible for all **social sciences**, neither is it applicable in all **natural sciences**. Both domains contain regions where **controlled experimentation** is impossible, giving way to **field-based quasi-experimental research** governed by contextual or natural constraints.

120.24. The Field–Laboratory Distinction and Its Consequences

In traditional methodological taxonomy, a distinction is made between **field studies** and **laboratory studies**. Regardless of whether the field belongs to the **natural** or **social** sciences, the key difference is that **field research** unfolds in **open, dynamic environments**, where countless variables operate simultaneously.

Whenever an independent variable is introduced or modified within a field setting—be it a **marketing campaign in social media** or a **probe launched toward a black hole**—the mere fact that the study occurs in an **open environment** makes it **impossible to establish laboratory conditions**. Therefore, **any field application of experimental logic**, no matter how sophisticated, must be recognized as **quasi-experimental** in essence.

In other words, **the impossibility of isolating variables** in real-world environments transforms every field experiment into a **probabilistic exercise**: results are valid within a

temporal and contextual framework but **cannot be replicated exactly** in other moments or systems. From the perspective of *Impossible Probability*, this lack of replication potential marks the transition from **deterministic experimental science** to **probabilistic science**, where the interpretation of patterns replaces the search for immutable laws.

120.25. The Absence of Control Groups in Quasi-Experimental Research

A further characteristic distinguishing **quasi-experimental** from **experimental** research is the **absence of a true control group**.
In experimental settings, a **control group** is exposed to **identical conditions** as the **experimental group**, except for the manipulation of the independent variable. This allows direct comparison and causal inference.

In quasi-experimental contexts, however, such **perfect equivalence** is impossible. For example, when studying the **effects of inflationary policies** during an economic crisis, researchers can only **approximate control** through **comparative analysis**—examining similar countries that adopt different fiscal or monetary strategies. Yet these comparative units are never identical; social, cultural, and political variables differ. Consequently, such comparisons serve as **analogical controls**, not **true experimental controls**.

[In the AI Revolution we are introducing, one might consider using countries where the technology is not initially deployed as a control group, allowing outcomes in early-adopting countries to be compared with those where the technology has not yet been introduced. While this is a possible approach—comparative studies—we should note that international comparisons must account for differing national conditions; not all outcomes will be replicable, and some results may be unexpected.]

120.26. The Case of Planetary Terraforming as a Quasi-Experimental Model

Another example, this times in engineering, consider a hypothetical study of the **effects of terraforming techniques on Mars**. Even if researchers perform **virtual simulations** and construct **mathematical models** to predict outcomes, once the intervention occurs

on the actual planet, the operation would **no longer meet the criteria of an experiment**. Despite being called an "experiment" by space agencies or governments, the procedure would, in reality, constitute a **quasi-experimental model**.

This is because there is **no control group Mars**, nor any possibility of reproducing conditions. Terraforming Mars would involve **irreversible manipulation of a unique system**, without the capacity for controlled repetition. The research would yield valuable data, but those data would be **context-specific**, shaped by the unique conditions of a single planetary case.

120.27. Core Differences Between Experimental and Quasi-Experimental Methods

Summarizing the principal distinctions:

- In **experimental methods**,
    1. The **independent variable** is directly **manipulable** by the research team;
    2. **Laboratory control conditions** ensure isolation and replicability;
    3. There exists a **true control group** for comparison.
- In **quasi-experimental methods**, at least one of these three conditions fails to hold:
    1. Manipulation of the independent variable is **nonexistent, limited, or indirect**;
    2. There is an **absence of laboratory control**, typical of **field-based applications**;
    3. There is **no true control group**, only comparative or analogical contrasts.

Quasi-experimental research thus represents a **spectrum of methodological flexibility**, bridging **strict experimentation** and **observational analysis**, while retaining the **intent of causal interpretation**.

[While the **absence** of an independent variable could be seen as an obstacle to define something as a **quasi-experiment**, we come back to one of our previous observations: the American Revolution, the French Revolution, the Russian Revolution, and the Chinese Revolution could be regarded as social quasi-experimentation, and there was no independent variable. In complex systems we can intervene, and in complex systems all **variables** may interact with each other, being interdependent variables; there is no independent variable—we just manipulate an interdependent variable, or manipulate a **dependent** variable. From our point of **view**, even at some distance, London is a complex scenario right now, where there is no **truly** independent variable; every variable depends on something or someone else, and in an extremely complex scenario **quasi-experimentation** is possible.]

120.28. Epistemological Value of Quasi-Experimental Knowledge

Despite its limitations, the **knowledge generated through quasi-experimental research** is of **great epistemological and practical importance**. In many scientific domains—whether **economic**, **psychological**, **ecological**, or **cosmological**—it is the only possible path to understanding **complex, non-manipulable systems**.

Through the application of **statistical and probabilistic methods**, quasi-experimental designs can yield **quantitative insights** into how variables interact dynamically, even when **causal control is incomplete**. The data obtained may not conform to the classical criteria of reproducibility, yet they remain **essential for hypothesis testing**, **model validation**, and **probabilistic inference**.

From the standpoint of *Impossible Probability*, quasi-experimentation represents a **transitional methodology** in the historical evolution of science: a movement away from **deterministic experimentation** toward a **probabilistic epistemology**, in which truth is not defined by total control, but by **statistical consistency**, **rational coherence**, and **empirical correspondence within changing conditions**

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